THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—47TH YEAR SYDNEY, SATURDAY, OCTOBER 15, 1960 No. 16

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MEDICAL MORBIDITY IN A GENERAL HOSPITAL.

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A SURPRISINGLY limited amount of research in Australia has been directed to morbidity surveys or to the study of hospital function; as a consequence there exists a paucity of information upon which to base policy on the development of medical services. Much useful information on both these matters is to be obtained by analysing hospital morbidity. In this communication, statistics relating to 1908 consecutive admissions to a medical unit in a general—and since 1956, teaching—hospital in the period July, 1956, to June, 1959, inclusive, are presented. The data have been collated and presented in a manner designed to answer the following questions: (*a*) Which social and economic classes are at present the predominant users of general hospitals? (*b*) What forms of medical morbidity are referred to a general hospital for investigation and treatment?

Administration.

The Royal Perth Hospital has approximately 600 to 650 beds, of which about 200 are occupied by patients with "medical" complaints. The unit of the University Department of Medicine is one of five which share an admitting rota. The great majority (90%) of patients are admitted on "take" days or from the out-patient department. The balance of 10% of patients are referred for investigation from colleagues and from other units. It is not considered—although no proof is submitted—that bias enters the statistical picture; it may be assumed that the experience reported here does not differ substantially from that of the other four medical units.

The unit system operates in this hospital, a patient always being readmitted to the unit, or to the corresponding surgical unit, to which he or she was first arbitrarily allocated. Data shown in Table I indicate that a substantial proportion (23%) of the total admissions under review were readmissions. Of these 442 readmissions, the majority (61%) were in respect of patients who were admitted three or more times to the unit in the three-year period.

It will be seen in Table II that the admissions are rising steadily each year at a rate disproportionate to the over-all population increase in the community. Readmissions in this short period have doubled. These figures illustrate the truisms that more people are entering the age groups in which morbidity from neoplastic, vascular and chronic respiratory disease is most likely to occur, and that in respect of the two last-mentioned groups of morbidity, modern treatment keeps people alive longer. Surveys of

general hospital bed requirements in communities need to be constantly brought up to date in the light of rapidly changing therapeutic circumstances.

Seasonal Trends.

The variation in the monthly admissions rate is shown in Figure I. The range varies from 30 admissions per month (December, 1956) to 80 (in April, 1959). This is to say that the medical population of a general hospital

TABLE I.
Data on Admissions and Mortality Rate.

Admissions.	Number.	Deaths.	Mortality Rate. (Percentage.)
Total admissions ..	1908	294	15·5
New admissions	1466	212	14·5
Readmissions	442	82	18·5

may vary by a factor of between 200% and 300%. Two consistent trends are to be noted in this figure—the low morbidity rate in the late spring and early summer months, particularly in December, and the high admission rate during those months when influenza virus is prevalent in the community.

The Patient Population.

Sex.

Male admissions slightly exceeded female admissions (987:921). The ratio of all males to females in Western Australia is 360:340 (1957); over the age of 60 years,

TABLE II.
Yearly Admission Rate.

Year.	New Admissions.	Re-admissions.	Total.	Metropolitan Population. (Thousands.)
1956–1957 ..	436	105	541	369
1957–1958 ..	485	145	630	376
1958–1959 ..	545	192	737	—

however, the ratio is reversed (33:36). Opposing trends cancel each other out to produce this admission ratio of near unity; in the 30 to 40 years decade there were 83 female admissions and 57 male admissions, whilst in the 70 to 80 years decade there were 131 male admissions and 105 female admissions.

Nationality.

Of all the patients, 162 (8·5%) were European (non-British) born and had migrated to the State within the previous three decades. Now recent immigrants comprise approximately 10% of the present Australian population, but a substantial proportion of this number are of British birth. Further, a majority of the European immigrants are young persons. At least 50% of these European patients had difficulty in speaking English. They could neither give a good account of their symptoms, nor could they have explained what was happening to them whilst in hospital. The experience of this and probably most other hospitals is that interpreting services are inadequate from both the clinician's and the patient's point of view.

There were seven aboriginal patients (eight admissions).

Geographical Source of Patients.

Western Australia is served by only two general hospitals, the Royal Perth Hospital and Fremantle Hospital; the more advanced diagnostic and therapeutic resources are concentrated in the former institution. The ratio of the population of the whole State to the metropolitan population is 691,000:380,000 (1957). However, only 11·5% of admissions to the medical unit were from non-metropolitan areas (a non-metropolitan district is defined as a residential zone beyond a 25 mile radius from Perth city).

In the spot map shown in Figure II, it will be seen that a substantial proportion of patients (40%) are drawn from the immediate environs of the hospital (East Perth, North Perth, West Perth and the inner suburbs). Only 3% of patients come from the well-to-do outlying suburbs of

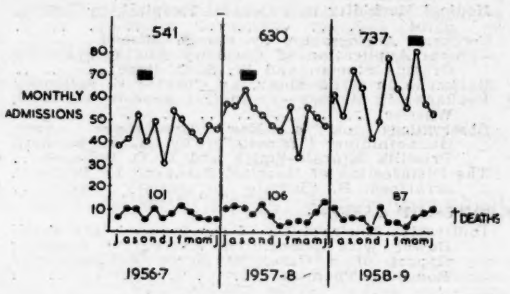

FIGURE I.
Monthly admission rate. Solid rectangles indicate months during which influenza virus (B, A, Asiatic A) was isolated from patients with respiratory tract infections.

Nedlands, Cottesloe and Claremont, which contribute 13% of the metropolitan population. The rest come from the predominantly working-class suburbs lying north and south of the river between Perth and Midland Junction and along the southern exit route from the city. Several factors are responsible for this uneven geographical distribution of patients. (i) Most of the private hosptals

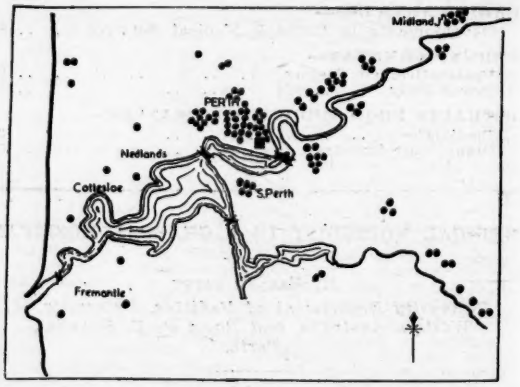

FIGURE II.
Spot map showing domicile of patients admitted from the metropolitan area. Each spot represents 1% of total admissions.

are situated between Perth and the sea, in the while-collar suburbs. (ii) However, these white-collar suburbs are inhabited by people of the younger age groups; those of the older age groups tend to live in the inner suburbs. (iii) There are no government-subsidized hospitals on the east or south side of the city. (iv) The feckless, the alcoholic, old-age pensioners and psychopaths, who contribute a disproportionate amount of morbidity, inhabit cheap rooming-houses in the city centre and inner suburbs. The quality of a hospital population is conditioned therefore by both socio-economic and demographic factors. A current trend is for persons to seek individual medical attention in private hospitals; this may have the effect of deflecting an increasing number of patients away from teaching hospitals. In fact, this trend probably does not

greatly influence the medical population of a general hospital, for it is found that about two-thirds of beds in private hospitals are occupied by patients undergoing elective surgery or confinements, the rest by those suffering from such common medical disorders of civilized life as coronary occlusion and peptic ulcer.

Socio-Economic Status.

About 35% of patients were in receipt of a pension (old-age, 30%; invalid, 5%). Of the male patients not in receipt of a pension, 15% were unemployed or only intermittently employed at the time of admission to hospital, and 20% were unable to return to work after their discharge from hospital because of gross disability, or because suitable or appropriate employment could not be found.

Serious medical morbidity, it is to be suspected, is not evenly distributed in the population of an urban society, morbidity rates being substantially higher among the socially less competent and the economically less privileged. This has been clearly demonstrated in relation to childhood illness (Spence *et alii*, 1954), and is implicit in the differential social class mortality statistics published periodically by the British Registrar-General, which show higher death rates from most diseases except myocardial infarction in the lower socio-economic classes (Logan, 1959).

Age of Patients.

In Table III, the percentage of patients in decennial age groups is shown. Nearly half the patients (46%), both male and female, were aged 60 years or more. Morbidity

TABLE III.

Age Distribution of Patients Admitted to Hospital (Percentage of Patients in Each Decennial Group).

Patients.	Age Group (Years).								
	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99
Males ..	5·5	8	9·5	12	19	19	19	7	1
Females	6	10·5	13·5	13	12	17	18	9	1

in males begins to take a serious toll in the fifties; in females the rising curve begins a decade later; and on the other hand, the female in her thirties seems to be more prone to forms of morbidity requiring admission to hospital.

This age distribution — one-quarter of the morbidity occurring in the over 70's — makes nonsense of the arbitrary cleavage made between internal medicine and geriatrics. The physician of today needs must be a geriatrician. In parenthesis, attention is also drawn in these statistics to a special problem of clinical administration—that is, the hospital placement of the sick adolescent, considered too old for a place in hospitals for children, but certainly too young to be exposed to the bloody and painful dramas enacted in open adult medical wards.

Length of Stay in Hospital.

On the average, patients stayed in hospital 21·5 days; the range varied from seconds to two years. Duration of admission is analysed in further detail in Table IV. It will be seen that for administrative purposes patients fall into the following three groups: (i) those who occupy a bed for less than two weeks—among this group mortality is high; (ii) patients who spend three or four weeks in hospital (patients recovering from myocardial infarction, etc.); (iii) patients whose infirmity precludes discharge under four weeks. The last group comprised one-fifth of all admissions.

Monthly admissions and length of stay in hospital may be combined to give a figure representing mean monthly bed occupancy. Figure III is one which might challenge the ingenuity of a hospital architect, for a wide fluctuation in the number of beds occupied is to be observed. On a given day, bed occupancy in the unit has been as low as 12, as high as 72. As mentioned above, an influx of

TABLE IV.

Length of Stay in Hospital.
(Figures represent percentages of all admissions.)

Patients.	Duration of Stay in Days.			
	0–14	15–28	29–60	61 and Over
Males ..	50	30	14	6
Females	55	25	15	5

patients is to be expected in seasons when respiratory tract viruses are prevalent; all medical units therefore are likely to be burdened at the same time. Medical wards fluctuate between a state of relative vacuity and gross overcrowding. The day-to-day administrative prob-

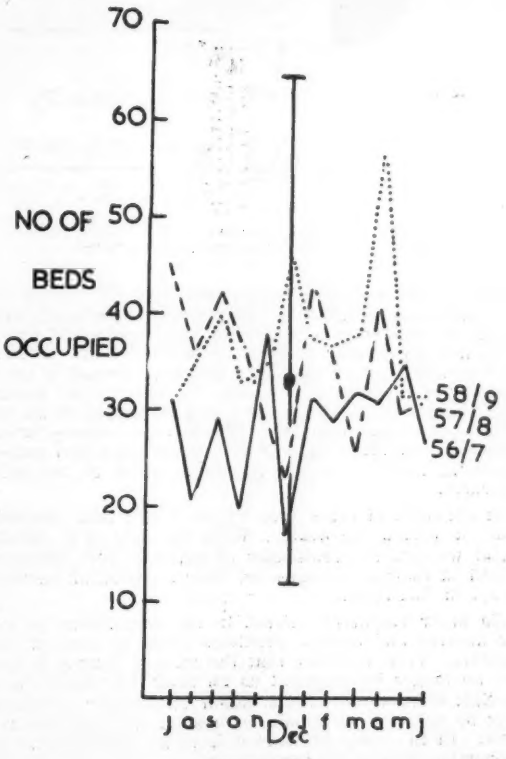

FIGURE III.

Monthly bed occupancy: mean, 34; monthly range, 17 to 57; daily range, 12 to 65.

lems which are related to this modern epidemiological picture are well known. In the first place, the comfort of patients is compromised. Secondly, overcrowding increases the serious risk of cross-infection. Thirdly, a strain is placed on nursing administration in meeting a demand for flexibility in the deployment of nursing staff.

The Problem of Long-Stay Patients.

A new problem confronts the modern general hospital, that of the long-stay patient. One in 20 of these admissions

was for a period of more than 61 days. Why is it necessary to keep so many patients in a teaching hospital for so long a period? Is it because of an absence of beds for the chronically infirm in the community, or is it because of real nursing and medical needs? In Figure IV the diagnoses recorded in long-stay cases are shown. About 40% of patients suffered from the complications of vascular disease — ischæmic heart disease or cerebro-vascular accident. Discharge was not possible because of the occurrence whilst in hospital of complications of the ictus which was responsible for the initial admission—namely, recurrent myocardial infarction, thrombo-embolic phenomena, or respiratory, urinary tract or septicæmic infection. Terminal carcinoma accounted for 15% of

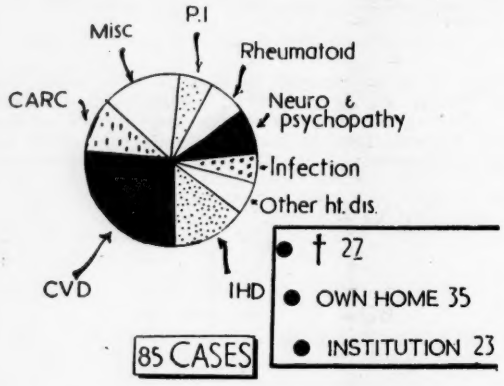

FIGURE IV.

Diagnosis and ultimate placement of 85 patients remaining in hospital for longer than 61 days.

extended admissions. Exotic infections (*pyocyanea* and staphylococcal septicæmia, pneumococcal meningitis, etc.), advanced pulmonary insufficiency and rheumatoid disease accounted for similar proportions of admissions. Patients with neurological or psychotic disorders formed a special category of extended admissions. There were two patients with hysterical symptoms for whom treatment in an open ward was deemed desirable. There were several patients with alcoholic brain damage and polyneuritis, and patients requiring nursing in the terminal stages of myopathic disorders.

In one-third of cases (see Figure IV) a long admission was the prelude to death. With the help of a full-time social worker, the remainder of patients were ultimately placed in their own homes or, after a period of inevitable delay, in institutions.

No other resources existed in the community to solve the nursing and clinical problems posed by most of these patients. This is to say that the modern general hospital can no longer be regarded as an acute hospital. On the medical side, at all events, about one-quarter of patients may be expected to remain in hospital for four weeks at least. In the years to come it is to be expected that this proportion will increase.

Causes of Morbidity.

Causes of morbidity leading to hospital admission are shown diagrammatically in Figure V. This figure gives a false impression of the ease with which such data can be presented in a meaningful manner, for in more than half the cases multiple diagnoses were recorded. In respect of each individual admission, the prime presenting clinical problem, whether it is chronic bronchitis or diabetes mellitus, has been considered in producing this perspective on morbidity. In point of fact, more than 29% of all patients (see Figure V) actually suffered from clinically significant cardio-vascular disease; likewise acute and chronic respiratory infection was more prevalent than is indicated diagrammatically.

The myocardial or cerebro-vascular complications of atherosclerotic or hypertensive vascular disease together with acute and chronic bronchopulmonary infection accounted for half the morbidity treated. Psychiatric illness was no less important a cause of morbidity than the combination of morbidity due to peptic ulcer and

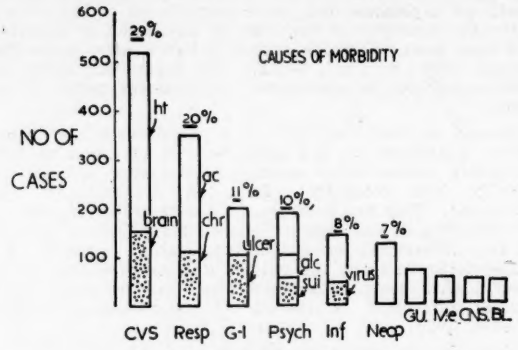

FIGURE V.

Causes of morbidity, in percentage, of all cases admitted. CVS, cardio-vascular disease; Resp., respiratory infection; G-I, gastro-intestinal disorders; Psych., neuro-psychiatric disorders; Inf., infections; Neop., neoplasms; GU, genito-urinary disease (including nephritis); Met., metabolic disease (including collagen disease); CNS, neurological disorders (non-vascular); Bl., anæmia and blood dyscrasia.

calculous biliary disease, and was numerically more important than infective illness. In parenthesis, what physicians might regard as "interesting cases" — disseminated lupus erythematosus, porphyria, the endocrinopathies, metabolic renal disease, the blood dyscrasias, and so on — comprised but a small proportion (less than 10%) of the total morbidity seen in medical wards.

Mortality.

The over-all mortality rate was 15·0%—17·0% in males and 13·0% in females. The causes of death, shown in Figure VI, follow a similar order to that seen in the

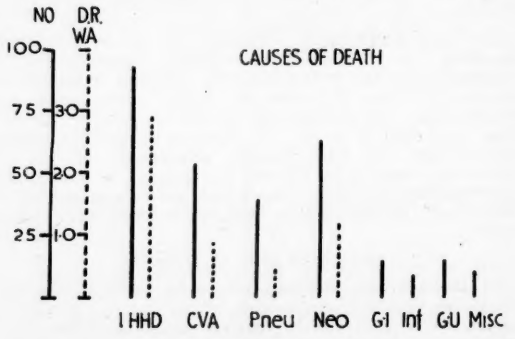

FIGURE VI.

Causes of death in hospital (solid columns); and death rates per 1000 from various causes in Western Australia (1957) (interrupted columns). I & HHD, ischæmic and/or hypertensive heart disease; CVA, cerebro-vascular accident; DR-W.A., death rate per 1000 live-born, Western Australia.

Registrar-General's statistics: heart disease > cerebro-vascular accidents > neoplasm > pneumonia and bronchitis. The juxtaposition of data on hospital mortality

and mortality in the whole community in this figure would support the view that morbidity seen in a general hospital is a true reflection of the morbidity occurring in the community.

Morbidity at Different Age Groups.

In Figure VII, causes of morbidity in the fourth and eighth decades of life are contrasted. As has already been pointed out, striking sex differences in morbidity occur

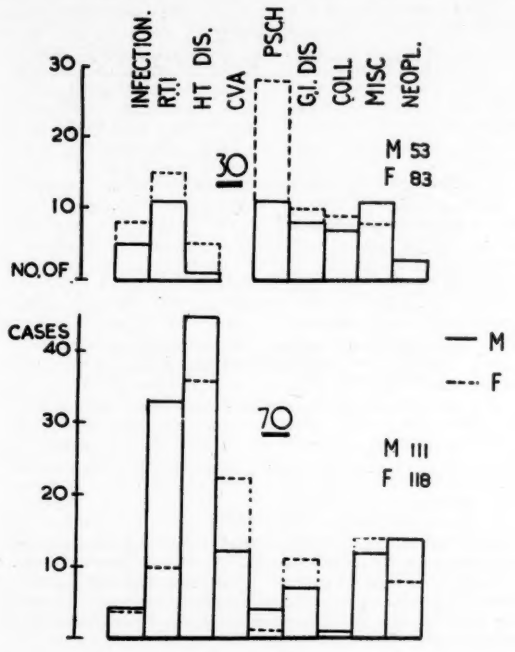

FIGURE VII.

Comparison of morbidity in both sexes, (*a*) in the 30 to 39 years age group and (*b*) in the 70 to 79 years age group. RTI, respiratory tract infection; Psych., psychiatric disorders; Coll., collagen diseases (including rheumatoid).

at these extremes of life. In the thirties women are particularly prone to psychiatric breakdown; the high incidence of respiratory tract infection is related to feminine proneness to the asthmatic syndrome; it is also worthy of note that clinically significant rheumatic heart disease (which accounted for most of the heart disease seen in the first half of life) is commoner in females than in males.

In this figure, the disproportionate incidence of ischæmic heart disease and chronic bronchial infection in the male in the seventies is seen at a glance. The slight excess of gastro-intestinal morbidity in females is attributable to feminine proneness to disease of the biliary tract.

Vascular Disease.

Autopsy experience indicates that few Australians who die over the age of 60 years fail to show signs of fairly extensive atheromatosis. Figure VII emphasizes what is well known about the natural history of the complications of atheroma—that the male is more likely to succumb to ischæmic heart disease, while the female is more likely to die as a result of cerebral thrombosis.

The incidence of various forms of heart disease in this naturally favoured community is shown in Table V, in which the supposed cause in 114 patients admitted to hospital with congestive heart failure is recorded. Of all heart disease, 80% is due to coronary artery disease, high blood pressure or chronic pulmonary insufficiency.

Respiratory Tract Infection.

Of the 350 admissions for respiratory tract infection, 230 were for acute bronchitis, bronchiolitis or pneumonia and 120 for exacerbations of chronic bronchitis. This division is an arbitrary one enforced by hospital coding requirements. In fact, in the great majority of instances acute and subacute infections were superimposed upon the background of chronic bronchial infection. Three-quarters of patients listed with this diagnosis were aged over 60 years. Notwithstanding the absence of industrial smog in

TABLE V.

The Causes of Congestive Heart Failure (114 Cases).

Type of Heart Disease.	Number of Cases.
Arteriosclerotic (chronic ischæmic heart disease)	59
Arteriosclerotic heart disease and hypertensive vascular disease	18
Hypertensive vascular disease	8
Rheumatic heart disease	11
Anoxic pulmonary heart disease	7
Beriberi heart disease	4
Obscure myocardopathy	4
Syphilitic heart disease	1
Constrictive pericarditis	1
Congenital heart disease	1
Total	114

the fairest of cities and the small proportion of patients exposed to dust in their past occupation, chronic bronchitis is a far more frequent cause of morbidity than carcinoma. Males with respiratory infection three times outnumbered females.

Neoplasm.

In the 120 admissions for cancer, the order of frequency was: lung > stomach > pancreas > blood-forming organs (leukæmia and reticulosis) > brain > secondary melanoma > miscellaneous.

Gastro-Intestinal Diseases.

These accounted for 200 admissions, 104 being for peptic ulcer and gastritis and their complications. There were 88 admissions (87 patients) for hæmatemesis or melæna, the causes of which are listed in Table VI. There is one

TABLE VI.

The Causes of Gastro-Duodenal Hæmorrhage (87 Cases).

Cause.	Number of Cases.
Duodenal ulcer	30
Chronic gastric ulcer	13
Acute ulcer or "gastric erosion"	18
Stomal ulcer	3
? Hiatus hernia	3
Œsophageal varices	3
Gastric neoplasm	2
Drugs ("Butazolidin", aspirin, anticoagulants)	12
Cause undetermined	2
Total	86

notable point in this table—the relatively high incidence of iatrogenic hæmorrhage: "Butazolidin" (four cases), aspirin (two cases) and "Dindevan" (five cases) were the drugs incriminated. Seven patients died, three after emergency gastrectomy, to which 11 patients were submitted. Of the patients with gastro-intestinal bleeding, 38 were aged 60 years or more.

Psychiatric Disorders.

The writer would not be the first to experience difficulty in arriving at a correct psychiatric diagnosis; Table VII lists provisional psychiatric diagnoses made in 157 admissions (10% of all new admissions). Thirty-nine patients made a real or hysterical gesture of self-destruction, 35 by swallowing barbiturate tablets. Sixty-three patients were considered to suffer from chronic alcoholism. It must be stressed that this is likely to be an under-estimate of the real incidence of alcoholism or its association with mental and physical disease; chronic alcoholism here refers only to the prime diagnosis, and no account has been taken of

TABLE VII.

Psychiatric Diagnosis Made in 157 Admissions.

Diagnosis:	Subjects.	
	Male.	Female.
Suicide attempts or gestures ..	12	27
Chronic alcoholism	44	19
Anxiety state	5	5
Hysterical conversion	11	16
Schizophrenia	2	1
Affective disorder	9	4
Drug addiction	1	1
Total	84	73

the persistent and heavy drinking which may have contributed to morbidity from peptic ulcer or the neglect of health which renders a person more susceptible to infection. Thirty-eight patients presented with symptoms of anxiety or hysterical conversion mimicking organic disease. To many general practitioners the general hospital was a convenient institution to which patients with acute psychotic disturbances could be referred in an emergency (16 cases).

Drug-Induced Disease.

Nearly one-tenth of all admissions (180) were directly or indirectly related to the misuse of a drug, self-administered or prescribed by a medical practitioner (see Table VIII). It is disingenuous perhaps to include ethyl alcohol in this category; certainly it stands at the head of the list, followed by the barbiturates; in these instances, misuse has a psychiatric connotation.

The treatment of cardio-vascular disease is associated with increasing hazards: hæmorrhage and dermatitis complicated treatment with anticoagulants; the widespread use of chlorothiazide appears to be associated with the increased frequency of digoxin toxicity; and the injudicious use of ganglion-blocking drugs led to fatal renal and cerebral ischæmia in two cases.

Salicylate or phenacetin is by no means harmless (acidosis, hæmatemesis, sulphhæmoglobinæmia), and the use of "Butazolidin" (hæmorrhage, aplastic anæmia or thrombocytopenia) is sufficiently hazardous to warrant the strictest indications in prescribing.

An interesting negative observation is the absence in this list of complications attributable to the use of steroid compounds.

Six deaths, which should be regarded as being avoidable, were attributed to the use of drugs in treatment prescribed prior to the patients' admission to hospital.

Miscellaneous Observations.

Four patients (two deaths) acquired septicæmic infections (staphylococcal in two instances, *pyocyanea* and *Streptococcus fæcalis*, one each) whilst under treatment in the unit.

Malnutrition, general or with specific avitaminosis, was a frequent diagnosis in the majority of patients with chronic alcoholism, and also in a number of elderly patients. With respect to the latter, in 20 admissions specific mention was made of clinical evidence of malnutrition (obvious weight loss, mild neuropathy, iron or folic acid deficiency anæmia). It is relevant at this point to quote the experiences of Dr. W. R. Pitney, of the Hæmatology Department. He has found that of 117 consecutive cases of megaloblastic anæmia studied in 1957-1959, the cause appeared to be deficiency of folic acid in 25 cases. Dietary deficiency in old age accounted for nine of these cases.

TABLE VIII.

Drug-Induced Disease: A List of the Provocative Drugs.

Drug.	Number of Cases.
Ethyl alcohol (psychopathy, neuropathy, beriberi, etc.)	87
Barbiturates	37
Salicylates and phenacetin	8
"Dindevin"	7
"Butazolidin"	6
Organic phosphates	4
Cardiac glycosides	5
Ganglion-blocking agents	4
"Largactil"	3
Habit-forming narcotics	3
Sulphonamides	2
Miscellaneous—as quinidine, lead, tetanus antiserum, "Antabuse", ACTH, gold, chloramphenicol, etc.	14
Total	180

Discussion.

It is not to be expected that a survey of this nature will bring to light any startlingly novel information; but if family doctors, hospital clinicians and administrators could be persuaded to see a hospital in the same perspective even for one brief moment of time, then this statistical exercise may have been justified.

If the forms of morbidity which in present circumstances warrant admission to hospital are viewed from a speculative distance, it is seen that in younger patients serious illness has very frequently an overt genetic or psychogenic basis. To revert to Figure VII, it will not escape notice that in the background of respiratory tract infection, rheumatic and rheumatoid disease, peptic ulcer and even psychiatric disorder, which comprised the bulk of illness, lurks the factor of genetic predisposition. Psychodynamic factors operate to a not inconsiderable extent in causing the exacerbation of symptoms of asthma and ulcer, as well as in causing neurotic pain and suicidal gestures. It is not easy to prevent this sort of illness; with more intensified urbanization of our society and with the cure and prevention of infection in the very young, the volume of genetic and psychogenic morbidity in the later decades of life may increase in future years. Atheroma, bronchitis and cancer account for nine-tenths of illness past middle age. The possibility of their prevention seems also, at the moment, remote; meanwhile, more cohorts are entering the heavy morbidity age groups, and the pathologically ill consequences of the sedentary and dietetically indulgent way of life are being extended to all socio-economic classes. It may confidently be predicted that over the next half-century the demand for hospital beds will not decline in proportion to growth of population, but may well increase, and that costs of medical treatment will continue to rise.

If the general physician, as opposed to the cardiologist, the endocrinologist, the hypertensologist and so on is to survive in the future, as one hopes is thought to be desirable, then he also will require a pair of spectacles to correct his clinical astigmatism. Half his patients will have reached retiring age and may well resent being labelled as "geriatric problems"; and in perhaps a fifth

of his cases our consultant will be required to arrive speedily at a psychodynamic interpretation of symptomatology. The perspective seen here may well cause the medical profession to wonder whether accentuations given in undergraduate and post-graduate experience are appropriate in contemporary circumstances.

In this particular hospital population, there was a high proportion of very old people and persons with neurotic and psychopathic personalities. The young, the comparatively well-to-do and the physically and mentally robust were conspicuously rare. It has been argued in many places that a consequence of voluntary medical insurance has been to deflect many who in former years might have been admitted to a general hospital into private hospitals. To some extent this is probably true, for certain categories of morbidity—coronary occlusion, peptic ulcer and hypertensive vascular disease in younger people, for example—were missing. The matter warrants urgent investigation, for if deflection is occurring to a significant extent, then the long term consequences to the development of medicine in this country could be disastrous. Faculties must have a representative range of medical and surgical morbidity upon which to teach the principles of clinical science, and worthwhile research is possible only if all cases of rare diseases and examples drawn from all age groups and socio-economic classes of common diseases are admitted to teaching hospitals.

It is thought, however, that as far as medical morbidity is concerned, the factor which has been of the greatest quantitative importance in determining the patient population is the skew distribution of morbidity in the age groups and socio-economic classes. It is important that distribution of morbidity in relation to age and social class should be studied more closely in our rapidly expanding urban areas, for of the factors which determine the siting of a hospital, one of the most important would seem to be the demographic consideration of where people who are most likely to become ill reside. Now new peripheral suburbs are inhabited, on the whole, by younger, more prosperous families; the less prosperous, the widowed, the pensioners, the psychotic and the alcoholic tend to dwell in older property nearer the centre of cities, where rents are cheaper. In short, sound hospital planning should be based on sound medico-sociological documentation; of the existence of the latter there appears to be all too little evidence.

A general hospital ward is now occupied by a far wider range of social and occupational classes than in the old charity hospital days, and the spectrum of clinical problems constantly broadens. The staff of a ward have to administer for the juxtaposition of the demented down-and-out and the well-to-do man with the rare disease admitted for research investigation, of adolescent boys with rheumatic fever and old men noisy from cerebral anoxia. Moreover, patients may be classified according to their nursing needs: (i) There are those admitted merely for the convenience of investigation. (ii) There are those (with pulmonary œdema, anuria and acute respiratory failure, for example) who are desperately ill and require instrumentation and close observation by nursing and clinical staff. (iii) There are those who are less seriously ill, but are confined to bed and require frequent nursing attention. (iv) There are those who are recovering from acute illness, but who are ambulant and remain in hospital because of a slight risk of complications attending treatment (anticoagulation, for example). And (v), there are those who, it is realized on their admission, are likely to remain in hospital possibly for several months. Patients may move from one category to another; a seventy-year-old man may in sequence migrate from category (ii) to category (v).

It would seem that the monolithic structure of hospitals and traditional administrative methods could well become unassailable barriers to improvements in the care of patients. Hospitals have to solve a number of human and clinical problems. For one thing, the time of patients is not to be wasted. North American clinics have demonstrated how complex batteries of investigations may be quickly expedited on ambulant patients. In the second place, it is debatable whether the traditional inflexibility of the ward-unit system, in which four or five work in parallel, quite fits modern therapeutic demands. It could be argued that the same four or five wards could be put to more effective use if more flexible division of labour was permitted: a medical emergency ward for the reception of the dangerously ill patient requiring complex technical procedures and observation; acute wards for the reception of patients confined to bed and requiring frequent nursing attention of a less highly skilled nature; wards for ambulant patients; and wards for the aged and demented. Moreover, the present practice of congregating the young and the old, the relatively healthy and the desperately ill, the infected and the non-infected, together in a common ward is calculated to promote potentially lethal cross-infection and superinfection. In short, technical and nursing needs, together with epidemiological principles, are beginning to determine efficient internal administration and design. It may reasonably be expected of Dr. X in the future that he should visit his patients in several wards rather than that he should continue to hold sway over his court in one particular ward.

Indeed, it is becoming apparent that changes in clinical experience and present socio-economic trends are likely to bring about a revolution in thought on hospitals, a revolution as fundamental as that wrought by Miss Nightingale nearly a hundred years ago. Miss Nightingale had a military mind; hospitals were likened by her to barracks, and all subsequent hospital designers have subconsciously followed the dictates of this erstwhile genius. Perhaps the time has come to move forward from the up-and-down four-square concept of a hospital to the notion of a group of architectural elements linked administratively and by common laboratory and radiological services. This architectural group may include general medical and surgical beds disposed more fittingly to technological and human needs, a psychiatric wing, a private wing, a hostel for ambulant patients, an out-patient block, research blocks and a block for the use of general practitioners. In functional terms, a modern teaching hospital must embrace patients drawn from all socio-economic groups, must encompass a very broad spectrum of morbidity, and must provide an astonishing range of ever-changing technical procedures; to accomplish this, architectural fragmentation seems likely to be an inevitable development. One of the main arguments against horizontal fragmentation and for the existence of the towering vertical rectangle has been the problem of traffic and communication. Elevator traffic creates its own problems, and with automatic devices and television communication should no longer present the problem they once did.

Summary.

1. Demographic data and patterns of morbidity in respect of 1908 admissions to a medical unit in a teaching hospital in the years 1956 to 1959 have been reviewed.

2. A disproportionate number of patients were old and resided in the poorer, more congested, residential areas. There are reasons to believe that this is not because general hospitals continue to bear the stigma of the charity institution, but because morbidity rates are higher—to what extent is not certainly known—among the unemployed, the socially and mentally unfit and old-age pensioners.

3. "Degenerative" cardio-vascular disease and chronic bronchial infection together accounted for 58% of illness requiring admission to hospital, neoplasm for 7% and psychiatric complaints for 10%.

4. Chronic illness accounted for 25% of admissions. There is no reason to suppose that patients remaining in hospital for periods in excess of two months could have been more expeditiously or economically managed in other institutions; wherever they had been cared for, costly and skilled nursing and medical attention would have been mandatory, and little net saving to the community would have been effected.

5. It is doubtful whether the currently fashionable architectural design of hospitals is suited to their changing function. Arguments are submitted in favour of the concept of a flexible group of interrelated elements jointly using engineering, technological and diagnostic facilities, in preference to the "barrack" or "cathedral" architectural style.

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CORONARY ANGIOGRAPHY.[1]

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Until quite recently techniques for visualization of the coronary arteries in humans were largely of academic interest, and there was no real place for their application to the practice of clinical medicine. However, recent advances in the surgical treatment of coronary artery disease have led to a renewed interest in coronary angiography, and radiological demonstration of these vessels during life must now be regarded as an essential diagnostic procedure. During the past decade surgery has offered a means of relieving arterial obstruction due to atherosclerosis. Brilliant results are now possible in selected cases of occlusive disease of the aorta, the renal arteries, the blood vessels to the extremities, and even the carotids. Such surgery, in selected patients, is an accepted procedure. No one claims that these operations are cures—they are simply palliative; but, if successful, they may save life or limb for many years.

It is a logical step to extend these techniques to the relief of coronary artery obstruction, and the first direct surgical relief was reported by Murray in 1953. Since then other surgeons have achieved very promising results in this field, notably Bailey of Philadelphia and Longmire and his colleagues of Los Angeles, and reports from other centres are now appearing fairly frequently.

However, it is not technically possible to perform endarterectomy on every patient with ischæmic heart disease. For example, Zsilagyi, McDonald and France (1958) working in the Henry Ford Hospital in Detroit, made necropsy studies of the hearts of 79 patients over the age of 50 years with a history of ischæmic heart disease. Using liberal criteria, they found that in only 13% of these patients would it have been possible to perform a technically "curative" operation—that is, an operation in which all the obstructive lesions could be relieved. In a further 43% some palliation was possible, but in 44% the atheroma was too peripheral and diffuse, and hence inoperable. These results are perhaps not as discouraging as they appear on the surface. These workers selected patients over the age of 50 years; had patients been selected irrespective of age, then the rate of technical "curability" might well have been higher.

It is therefore most desirable to perform coronary angiography on patients who are considered to be suitable candidates for coronary artery surgery, and this is the first indication for the procedure.

The second indication is in the objective assessment of surgical and medical treatment. It is imperative to perform post-operative angiography on patients who have been submitted to coronary artery surgery to establish the patency or otherwise of the portion of artery on which endarterectomy, by-pass or grafting was performed. Similarly, coronary angiography will be an excellent method for determining objectively the effect of long-term anticoagulation or unsaturated fat diets. At present we have no real evidence that such therapy influences the natural history of coronary disease.

The third indication for coronary angiography is in the diagnosis of "difficult" or "obscure" chest pain. The exclusion of ischæmic heart disease may save a patient many years of morbid anxiety or risky treatment with anticoagulants, but equally important is the fact that the demonstration of a localized lesion may lead to possible surgical relief.

How then can the coronary vessels be visualized during life? The problem is simply one of placing a quantity of radioopaque medium into the root of the ascending aorta so that it will enter the coronary arteries. Angiocardiography, either venous or selective, provides the simplest technique for introducing opaque medium indirectly into the arota. Unfortunately, by the time the medium has traversed the lungs and the left side of the heart it has been diluted to such an extent that, even under the best conditions, only partial coronary opacification is possible. Di Guglielmo and Guttadauro, working in Jönsson's clinic in 1952, reported no coronary opacification in a series of 48 venous angiograms, and opacification in 9 out of 121 selective angiograms. Therefore angiocardiography is of no practical use as a method of coronary artery visualization.

The introduction of an opaque medium directly into the left ventricle by means of needle puncture or by catheter—left ventriculography—produces coronary opacification a little more consistently than does angiocardiography. In a recent report by Lehman, Boyer and Winter (1959) of a series of 202 left ventriculograms, failure to opacify either coronary artery occurred in only 5% of cases, but visualization was noted as excellent in only 7%. In 31 left ventricular injections performed in dogs in our own department, some degree of coronary visualization occurred in 16, but I considered this to be good in only 4. Moreover, opacification of the left ventricle by the medium obscures the coronary vessels.

The next possible method is to introduce contrast medium directly into the root of the aorta in the vicinity of the coronary ostia. This was first done by Peter Rousthöi in Stockholm in 1933. He experimented on a series of rabbits and one monkey, and by means of aortic needle puncture and by aortic catheterization he injected medium into the coronary sinuses and produced good opacification of the coronary arteries. He was apparently the first to perform aortography in animals using the standard methods of introducing medium into the aorta which are in use today—namely, needle puncture and retrograde catheterization from a peripheral artery. No further attempt to demonstrate the coronary vessels in life appears to have been made until 1945, when Stig Radner confirmed Rousthöi's work on animals, and then studied 5 patients. He punctured the aorta through the sternum and gave 20 to 30 ml. of "Thorotrast" by hand injection. Three years later, in 1948, retrograde aortic catheterization was used for the first time in humans in Sweden, and Jönsson then applied the technique to obtain coronary angiograms in 5 patients with surprisingly good results.

Many reports have since appeared on the technique of coronary angiography in the experimental animal and in man. All workers have found that the random injection of opaque medium in the vicinty of the coronary ostia fails to opacify the coronary vessels in 25% to 30% of human subjects. Di Guglielmo and Guttadauro (1952) found no coronary filling in 47 out of a total of 159 aortograms. Lehman and his colleagues (1959) reported total failure in 10 out of 40 attempts, and Lemmon *et alii* (1959) failed to cause coronary opacification in 5 of a series of 28 patients. In all human work, the dose of medium should not exceed the usually accepted safe

[1] Synopsis of a lecture given at a seminar on coronary angiography held at St. George's Hospital Medical School, London, on April 2, 1960.

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upper limit of 1 to 1·25 ml./kg. body weight. In animals, however, where this dose can be exceeded, the coronary vessels will fill consistently when large quantities of medium are injected.

Hence, in employing the technique of thoracic aortography for coronary visualization, special methods have to be used to ensure that sufficient medium enters the coronary arteries. The most logical of these is catheterization of a coronary artery with direct injection of the medium, which was performed in dogs by West, Kobayashi and Guzman in 1958. More recently Mason Sones of Cleveland has used this technique to obtain human coronary angiograms—he catheterizes each coronary artery in turn and injects opaque medium. This technique is potentially dangerous, at least on theoretical grounds, for Brofman, Leighninger and Beck (1956) have shown that the induction of differential anoxia in the myocardium—such as may occur with Sone's technique—is likely to precipitate ventricular fibrillation.

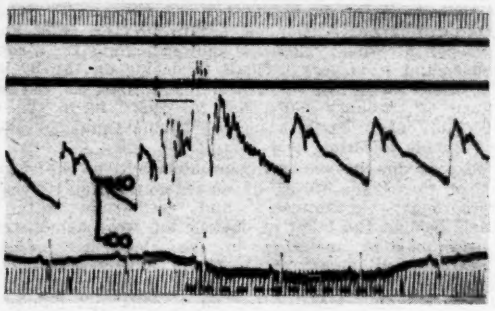

FIGURE I.

Recording taken during coronary angiography in a dog, showing the timing of the injection in relation to the electrocardiogram and the central aortic pressure. The top two tracings were produced by the beginning and end of the injection, and the line drawn horizontally below these tracings indicates the length of the injection. The broken horizontal line below the electrocardiogram is an automatic indication of 12 serial X-ray exposures; the beginning of each segment indicates the moment of each exposure.

FIGURE IV.

Recording of a double diastolic injection. The beginning of the horizontal line beneath the electrocardiogram is an automatic indication of a single X-ray exposure (see Figure V) taken at the end of the diastolic period during which the second injection was given.

Other special techniques depend on delivering medium close to the coronary ostia, and by one method or another ensuring its entry into the coronary arteries. This can be done in one of three ways: (i) occlusive aortography, (ii) cardiac arrest, and (iii) timing of the injection.

Occlusive aortography was developed by Charles Dotter and Louis Frische (1958) of Portland. Their method was to cut down on a peripheral artery and to pass a special catheter with an inflatable balloon near its tip. The tip of the catheter was placed in the ascending aorta, the balloon was inflated, medium was injected, X rays were exposed, and the balloon was deflated. Coronary artery filling is excellent provided that the catheter is correctly placed, but the balloon may prolapse downwards and occlude the orifices of one or both coronary vessels, and incomplete occlusion of the aorta may also lead to poor coronary filling. Other dangers include the possibility of cardiac rupture through a fibrotic or recently infarcted area, and failure of the balloon to deflate rapidly. The end of the catheter is bulky, and its insertion into a peripheral artery tends to be difficult and traumatic. I have had no personal experience in the use of this method, but it was used by Jefferson and Sloman in our department in dogs and found to be unsatisfactory.

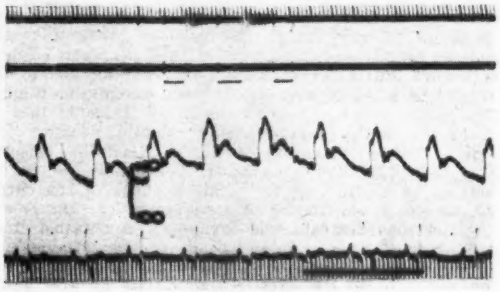

FIGURE VI.

Recording of a treble diastolic injection. A single X-ray exposure was made at the end of the third diastole. (See Figure VII.)

Coronary angiography during cardiac arrest produces excellent coronary visualization in animals and humans, and the use of acetylcholine arrest was first reported by Arnulf and Charconac of Lyons in 1958. The technique is basically very simple. Acetylcholine is given either intravenously or directly into the aortic sinus; and during the period of arrest which lasts from five to eight seconds, the opaque medium is injected into the aorta. Arnulf and Charconac performed 300 arrests in dogs without failure of the heart to restart, and there were no deaths in 26 humans. On a few occasions, when arrest was prolonged, the intra-aortic injection of atropine promptly restored the heart beat. Sloman and Jefferson used this technique in dogs; and in 103 angiograms in 20 dogs, no deaths occurred from the drug. Acetylcholine, however, has a very powerful vagotonic effect, and there is always the possibility of inducing ventricular fibrillation with any vagotonic drug. Dotter (1959) believes that the combination of acetylcholine and digitalis is particularly liable to precipitate ventricular fibrillation, and he reported the

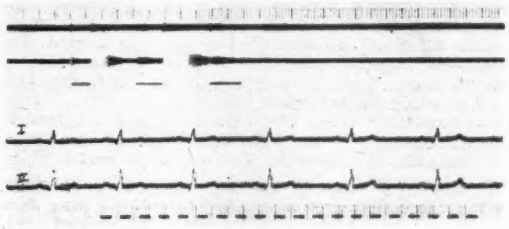

FIGURE VIII.

Recording taken during coronary angiography performed on a patient with ischæmic heart disease. Three injections were given over three successive diastolic periods.

death of a patient who was on digitalis therapy and was given acetylcholine for coronary angiography, with the development of irreversible ventricular fibrillation. A combination of acetylcholine arrest and occlusive aortography is now used extensively by Dotter and his colleagues for human coronary angiography. In our department it was felt that acetylcholine arrest was potentially dangerous, despite the evidence in the literature and the experimental work carried out by Sloman and Jefferson, and we sought a safer method.

It was decided to make an attempt to time our injections of medium in relation to the cardiac cycle, a method suggested by Richards and Thal in 1958. Maximal coronary flow occurs during ventricular diastole—during systole, flow may be actually reversed (Green, Gregg and Wiggers, 1935; Gregg, 1950). Therefore, medium injected into the root of the aorta during systole should produce little coronary filling; whereas, with a diastolic injection, coronary filling should be good. To enable us to give injections of medium at any desired phase of the cardiac cycle, an electronic timing device triggered by the *R* wave of the electrocardiogram was developed. A detailed circuit diagram has been published elsewhere (Davies and Michell, 1960). In addition, this timer enables a single X-ray exposure to be made automatically at any desired time, or it will initiate a serial changer. The catheter for angiography has a blocked end-hole and four spirally placed side-holes. This allows more even distribution of the medium and prevents a jet of medium passing through the aortic valve into the ventricle and obscuring the field. The tip of the catheter is placed just above the aortic valve.

We found, with this timing technique, that systolic injection of medium indeed resulted in poor coronary filling; whereas diastolic injection led to consistently good opacification of the coronary vessels in dogs. For our initial experiments with the electronic timer we used cine-angiography, which gave comparatively poor definition and a small field size, rendering it unsuitable for adult hearts. This led us to use the direct method. Using direct films, with a serial changer, it was soon apparent that there were different phases of coronary blood flow. We had not appreciated this from our cine work, presumably because the image persisted on the intensifying screen. The proximal part of the coronary tree is filled at the end of the diastolic period during which the injection is given; distal filling, with poor proximal opacification, does not occur until the end of the following diastole (Figures I, II and III).[1] Thus it is evident that, after one injection, at least two films have to be exposed to show the whole of the coronary tree, and this necessitates the use of a serial changer.

It was then decided to test the effect of multiple diastolic injections. A new electronic timer was devised for this purpose, which enabled the total dose of medium to be divided into two or more equal parts and injected over two or more successive diastoles. Details of this timer are to be published (Michell *et alii*, 1960). With this timer, it was found that multiple injections resulted in complete coronary opacification on one X-ray film. Treble injections resulted in better filling of the small distal branches of the coronary tree when these films were compared with those taken at the end of a double injection (Figures IV, V, VI and VII). The demonstration of very small vessels, however, may be of less practical importance.

Multiple injections are advantageous because it is possible to take an X-ray picture of the whole coronary tree on one single film, thus eliminating expensive and complicated radiographic apparatus and reducing irradiation. Of more practical importance is that, in applying the technique to adult humans, it is very difficult to inject 50 to 80 ml. of medium over one diastolic period without placing a tremendous strain on the angiographic equipment and catheters. With a double, or better still with a treble, injection, it is possible to inject the total dose of medium quite comfortably even if tachycardia is present.

We never failed to produce coronary opacification by using any of these methods of diastolic injection. There were no instances of electrocardiographic change following the angiogram in any of the animals, and there were no deaths attributable to the injection of medium.

Coronary angiography has been performed in three patients using multiple diastolic injections and the serial changer. All three patients had coronary heart disease, but there were no immediate or remote complications or electrocardiographic changes (Figure VIII). The angiograms of all these patients showed extensive coronary disease, and it is very difficult to decide on the basis of this small series whether in humans there is the same pattern of coronary blood flow as there is in the dog. The study of a small series of normal subjects should resolve this question very simply.

What of the future? A big problem will be the recognition of retrograde filling of obstructed coronary vessels. Intercoronary anastomoses and retrograde filling of vessels beyond the point of obstruction were demonstrated by post-mortem injection in the classical studies of Schlesinger, Blumgart, Zoll, Davis and Wessler (1938, 1940, 1941, 1951). In 1948 Myron Prinzmetal and his colleagues, using labelled red blood cells and fluorescein, demonstrated that collaterals opened up very quickly after experimental myocardial infarction. Garamella and co-workers in 1957 confirmed earlier work performed by Gregg (1950) in demonstrating that the pressure beyond an obstructed coronary vessel returned to normal after four weeks. They then went on to perform coronary angiography, and found that the degree of opacification beyond the point of ligation was the same as it was proximally. It was mentioned that this opacification occurred in late films, but no details were given as to the time intervals at which the films were taken. To my knowledge, no other experimental angiographic work has been done on this problem. Thal *et alii* (1958) published a report of the late filling of an occluded anterior descending artery in a human, but gave no details.

Summary.

The possibility of direct surgical relief of coronary artery obstruction has led to a renewed interest in demonstrating these vessels during life. Various techniques have been reviewed, and a method of timed diastolic injection developed in our department has been presented. In many animal experiments this method of timed injection has proved to be safe and consistent.

Acknowledgements.

I am grateful to Dr. Aubrey Leatham and to Dr. Keith Jefferson for their encouragement and advice, to Mr. J. G. Davies who built the electronic timer and gave much valuable technical assistance, and to Miss D. Green for the radiography.

Addendum.

Since this lecture was given, my attention has been drawn to publications by Bellman *et alii* (1960) and Williams *et alii* (1960). These workers have devised a loop-end catheter which directs contrast medium towards the periphery of the ventricular outflow tract at the base of the aorta, thus allowing selective coronary opacification to take place. Preliminary results with the use of this catheter in sheep by G. Benness and the author are encouraging, and further work is being done along these lines. A grant for these experiments has been made by the St. Vincent's Hospital Medical Research Committee, and the Post-Graduate Medical Foundation of the University of Sydney.

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CLINICAL APPLICATION OF CORONARY ANGIOGRAPHY.

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AND

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UNTIL recently visualization of the coronary circulation in living man has been of incidental interest only. The material for the excellent study by Di Guglielmo and Guttadauro (1952) came from angiographic studies carried out for non-coronary heart disease. However, with increasing interest in the possibility of surgical treatment of coronary artery disease (Beck, 1935; Vineberg, 1946; Bailey, 1957; Longmuir, 1958; Kauntze, 1959) there has been a stimulus to demonstrate the presence of obstructive lesions in these vessels.

Coronary artery disease is diagnosed clinically on the basis of the pain of myocardial ischæmia or the occurrence of myocardial infarction. The clinical diagnosis is usually supported by an abnormal electrocardiogram. While the electrocardiogram gives a good indication of the presence and location of dead or ischæmic myocardium, the exact site of an underlying obstructive arterial lesion can only be inferred from the tracing. In the absence of infarction, there is often little electrocardiographic evidence of the location or extent of the coronary artery disease. It is in such patients that the accurate demonstration of the abnormalities of the coronary circulation could be of great help if a surgical approach was planned.

Not infrequently the clinical examination, together with the electrocardiogram, still leaves us without a firm diagnosis in patients with anterior chest pain. In those patients for whom a definite diagnosis is imperative, an accurate demonstration of the coronary arteries would assist in management. In addition, much remains unknown about the natural history of coronary artery disease and the effect of various drugs, such as anticoagulants and cholesterol-lowering agents, on the anatomy of the coronary circulation. This gap in our knowledge can be bridged only by extending our study of all aspects of coronary artery disease, including accurate visualization of obstructive lesions of the coronary arteries in living subjects.

Early workers demonstrated the possibility of outlining the coronary circulation with radioopaque contrast medium (Rousthöi, 1933; Grossmann, 1945). In 1948, Jonssön performed aortography using a cardiac catheter passed through a peripheral artery into the ascending aorta to demonstrate the coronary arteries. With the development of less toxic contrast media and improved cardiac catheters, it has been possible to outline regularly the coronary arteries. Various methods have been employed to improve the technique. Dotter and Frische

(1958) used balloon occlusion of the aorta distal to the site of the injection to improve the filling of the coronary arteries. Later they combined this technique of occlusion with induced cardiac arrest, employing acetyl choline (Dotter *et alii*, 1959). Further animal work has confirmed the advantages and safety of short periods of induced cardiac arrest (Sloman and Jefferson, 1960). Arnulf *et alii* (1958) first reported the use of acetyl choline in patients under radiological control so that the tip was just above the aortic valve leaflets. The percutaneous technique described by Seldinger (1953) was used to catheterize the ascending aorta via a femoral artery in the other six patients. In these instances, an Odman-Ledin radioopaque catheter was inserted.

A Siemens mobile five-inch image intensifier was used for positioning the catheter. The electrocardiogram was

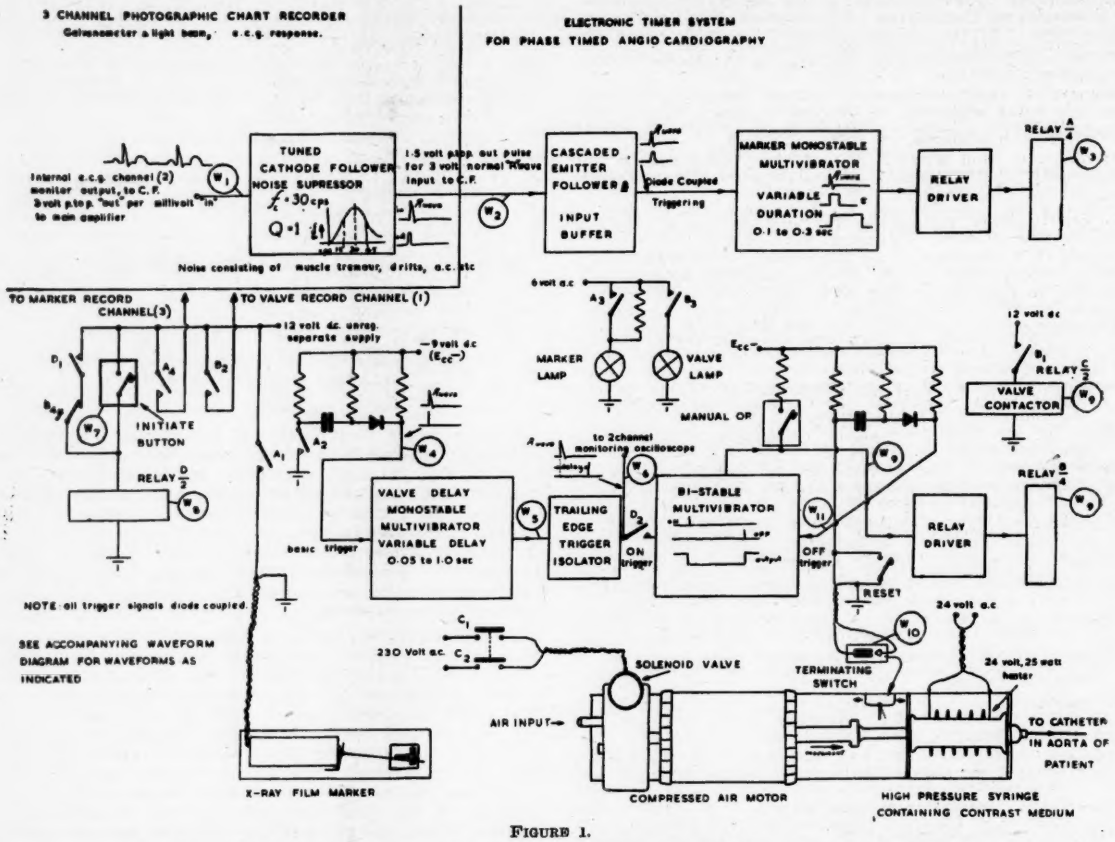

FIGURE 1.

A schematic diagram illustrating the method of timing the injection of contrast medium.[1]

to induce cardiac asystole, and thereby improve the filling of the coronary arteries with contrast medium.

Richards and Thal (1958) used an electronic device to trigger the injection of contrast medium so that the main bolus of contrast medium would be in the ascending aorta during ventricular diastole. A similar method of timing was used in cine-angiographic studies of the aortic valve and coronary circulation (Sloman, 1959).

The injection of contrast medium directly by percutaneous needle puncture, or by catheter, into the left ventricle does produce opacification of the coronary arteries (Lehman *et alii*, 1957), but the contrast medium in the left ventricle may obscure part of the coronary vessels.

Material and Apparatus.

Thoracic aortography was carried out on 20 patients as part of their clinical assessment. In two of these patients the examination was not performed specifically to demonstrate the coronary arteries. The average age of our patients was 44 years. The ascending aorta was catheterized via the right brachial artery in 14 patients using local anæsthesia. A radioopaque Lehman or Rodriguez-Alvarez type cardiac catheter, with the distal end blocked and with spirally placed side-holes, was passed monitored continuously on a cathode ray oscilloscope together with a pressure record as required. The contrast medium used was 76% "Urografin". A test injection of 8 ml. into the ascending aorta was employed to verify the position of the catheter. This injection was viewed through the intensifier. A single injection of 0·75 ml. per kg. body weight of 76% "Urografin", with a maximum of 50 ml., was used to opacify the ascending aorta. The injection of contrast medium was made rapidly, in approximately one second, using a simple compressed air mechanical injector[2] triggered by the *R* wave of the electrocardiogram (Figure I). Carotid artery compression was not employed. The patient breathed oxygen from a plastic face mask for five minutes before the injection and for some minutes thereafter.

Films were taken in the right posterior oblique position, almost true lateral, whilst the patient maintained full inspiration. An Elema-Schonander single-plane roll-film camera with individual frames 40 cm. by 30 cm. was

[1] Copies of the wave-form diagram are available from the authors.

[2] Manufactured by R. E. Jeffries Pty. Ltd., 79 Bouverie Street, Carlton, Victoria, Australia.

utilized. Three frames a second were exposed for three seconds, and one frame a second for a further three seconds. Accurate coning was used, and the gonads were protected from radiation. The focal film distance in most cases was 34 in., and typical settings were 300 mA using 80 to 90 kV with individual exposure times not exceeding 0·08 sec.

No arrhythmias occurred, nor were the patients troubled to any extent by the subjective sensation of warmth due to the contrast medium. Although transient *ST-T* wave depression was noted on a number of occasions, no patient complained of anterior chest pain associated with the injection of contrast medium. There were no cerebral or renal complications.

At the completion of the procedure, the catheter was withdrawn and the brachial artery was repaired. When the Seldinger technique was employed, firm pressure was maintained over the femoral artery for ten minutes after the removal of the catheter.

Results.

Of the 20 patients in this series, technically satisfactory angiograms were obtained in 12. The detailed results will be studied in relation to the indications for the investigation.

Aortic Valve Disease.

Fourteen patients were studied by left heart catheterization and aortography to assess the aortic valve. In addition to obtaining information concerning the anatomy of the aortic valve cusps, the angiogram was prepared specifically to visualize the coronary circulation. The systolic gradient across the aortic valve was measured in all of these patients either by the retrograde passage of the cardiac catheter into the left ventricle or by left ventricular needle puncture. In this group of patients, satisfactory angiograms were obtained in 11. In 6 the major coronary vessels were shown to be normal (Figure II),[1] but in the other 5 there was evidence of coronary artery disease. In 5 of the 11 patients with satisfactory angiograms it was possible to confirm the findings. At operation it was verified that in 4 patients the coronary arteries appeared normal, and in the other patient coronary atheroma was detected. In a further 3 of the 11 the coronary arteries were subsequently examined at autopsy (Figure III); their angiograms had shown abnormalities which were confirmed. The other 3 patients remained under observation. Two of these patients have normal coronary angiograms, but the third has evidence of considerable narrowing of the anterior descending branch of the left coronary artery. As he has an insignificant gradient over his aortic valve, aortic valve surgery has not been advised.

The unsatisfactory angiograms were due to a number of factors, the most important being the placing of the catheter tip at too high a level.

Combined Mitral and Aortic Valve Lesions.

Two patients with combined mitral and aortic stenosis were studied, and their coronary angiograms appeared normal. Observations at the time of operation in both patients confirmed the apparent normality of the major coronary vessels.

Miscellaneous.

Four additional patients were studied for a variety of indications. A male patient, aged 34 years, with mitral stenosis and clinical, radiological and electrocardiographic evidence of left ventricular hypertrophy, was investigated to exclude "silent" aortic stenosis. A cardiac catheter was passed across his aortic valve from the aorta, but the withdrawal trace did not show a systolic gradient. The thoracic aortogram confirmed the presence of a normal aortic valve, but the anterior descending branch of the left coronary artery was very small and filled poorly with contrast medium. At operation the vessel was observed to be exceedingly small, and, on palpation, there was thickening, suggesting coronary atheroma.

Two patients with aorto-pulmonary communications, one a patent ductus arteriosus and the other an aorto-pulmonary septal defect, were studied. The contrast medium was injected into the ascending aorta, but the shunt into the pulmonary arteries, with marked opacification of the lung vessels, made it difficult to see the details of the coronary circulation.

The last patient had an angiogram prior to a course of radiotherapy for a bronchogenic carcinoma. However, the catheter was positioned too high in the aorta and recoiled during the injection. The filling of the coronary arteries was unsatisfactory.

Complications.

No serious complications occurred in this group of patients. Although a number were seriously ill at the time of the investigation, the left heart studies were well tolerated.

The right coronary artery was inadvertently catheterized on one occasion. This resulted in the patient immediately complaining of anterior chest and neck pain, together with shortness of breath. The electrocardiogram showed *ST-T* elevation with a change in the pressure recording. The catheter was immediately withdrawn to the aorta (Figure IV). The pain was relieved, and the electrocardiograph and pressure record reverted to their previous state.

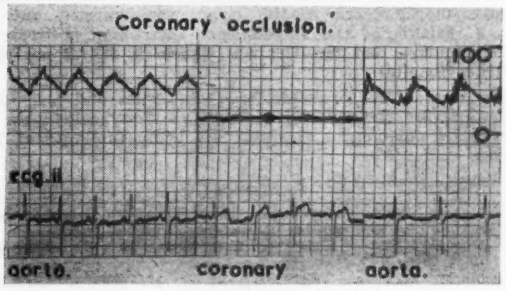

FIGURE IV.

The electrocardiogram and pressure recording before, during and after inadvertent catheterization of the right coronary artery. Note the *ST-T* elevation in Lead II during the short period of occlusion.

No patient suffered from any limb ischæmia following arterial catheterization. However, one patient developed a hæmatoma at the site of puncture of the right femoral artery. The hæmatoma was evacuated and the artery repaired two and a half months after the aortogram.

Discussion.

Coronary angiography has been used as a routine investigation to obtain additional information regarding the blood supply to the myocardium. It was possible to make a partial check of the angiographic findings at operation. No important discrepancy was detected. It is therefore considered that this is a reliable and safe procedure that should be carried out when additional information is required concerning the coronary circulation. In patients with aortic valve disease it may be important to know the state of the coronary circulation before deciding on the advisability or type of operation to be performed. Coronary angiography can be conveniently combined with measurement of the gradient across the aortic valve by catheter or left ventricular puncture.

Visualization of the coronary circulation might assist in the diagnosis of chest pain when the electrocardiogram is found to be normal. The demonstration of completely normal major coronary vessels would greatly assist the physician in his management.

[1] For Figures II and III see art-paper supplement.

In patients with established coronary artery disease a coronary angiogram might also help with the prognosis and with the evaluation of various forms of long-term medical treatment.

In the surgical treatment of these patients angiography might be valuable in deciding on the type of operation, whether a direct approach would be possible, and in assessing the result post-operatively.

Summary.

A method of coronary angiography has been described, utilizing a single timed injection triggered by the *R* wave of the electrocardiogram. The results of 20 coronary angiograms are discussed and correlated with operative or post-mortem findings in 11 of the patients.

An extension of this procedure is suggested to increase our useful knowledge of the natural history of coronary artery disease and the possible effects of medical and surgical treatment.

Acknowledgements.

We were greatly assisted in the left heart catheter studies by Dr. E. N. O'Brien, Mr. Ian McConchie, Mr. George Westlake and Mr. Lindsay Grigg.

Our interest in the study of the coronary circulation in living patients was stimulated by Dr. Aubrey Leatham and Dr. Keith Jefferson at St. George's Hospital, London. Mr. J. G. Davies of St. George's Hospital designed and built the timing device used in the early stages of this study; more recent modifications were carried out by Mr. J. Filshie of the Physiology Department, University of Melbourne, and Mr. Graham Tyson at the Royal Melbourne Hospital.

We would like to thank Dr. C. H. Fitts and Mr. John Hayward for their encouragement and our colleagues at the Royal Melbourne Hospital for their interest in this work.

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BACKACHE IN GYNÆCOLOGY.[1]

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Low back pain is one of the commonest problems encountered in gynæcology, and the possible causes of this complaint are legion; but it is as well to recall that gynæcological conditions and diseases account for only a very small proportion of cases (probably less than 2%). Orthopædic conditions, such as lesions of the vertebræ, muscles, ligaments and discs, are responsible for the vast majority. It is said that if the causes of low back pain were listed, no fewer than 150 lesions would have to be considered, and even then many conditions responsible for this symptom could be easily omitted.

It is essential, therefore, that a systematic attempt at a differential diagnosis of low back pain should be carried out in every case, and that this examination should be based on a consideration of the different lesions that can affect the various anatomical structures of the back, as well as on the presence or absence of any pelvic disorder.

We must always remember that backache is far more likely to be due to some trouble with the back itself than to any pelvic disease, and even if some gynæcological disease is found in a woman who suffers from backache, it does not by any means follow that the pelvic disease causes the backache.

If low back pain is secondary to some pathological condition in the pelvis, it is important to ascertain the distribution, extent and severity of the backache. Gynæcological backache is usually in the lumbo-sacral region, it is diffuse, often with a bilateral distribution, and it never extends higher than the fourth lumbar vertebra. Any backache which extends above that level and can be indicated with a finger-point is not due to an intrapelvic lesion.

Although intrapelvic lesions do not account for more than 2% of cases of backache in females, low lumbar backache is frequently present in patients suffering from pelvic disease, and observers such as Lynch, Ward and Bullard record that low back pain is complained of by most patients suffering from an intrapelvic lesion.

As the site and distribution of backache and pelvic pain depend in the main on the nerve supply of the diseased structure, it is important to be conversant with the nerve supply of the pelvis and the pelvic viscera.

The pelvis has a double innervation. The external genitalia are supplied by the somatic nervous system, and the autonomic nervous system supplies the internal genitalia and the peritoneum. Stimulation of the sensory nerves of the somatic system will cause direct pain in the viscera which it supplies, while stimulation of the nerves of the autonomic system will give rise to referred pain over the same segmental distribution as these nerves. Afferent impulses from the autonomic system pass up to the cord and higher centres, and the sensation of pain will be felt over the skin areas corresponding to the distribution of the peripheral sensory nerves, which have their origin in the same segment of the cord. For this reason it is important to be familiar with the segmental innervation of the internal genitalia, as well as with the surface areas corresponding to the same segment of the spinal cord. The ovary is supplied by the tenth thoracic nerve, the Fallopian tubes by the eleventh thoracic nerve, the corpus uteri by the twelfth thoracic and first lumbar

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 28, 1960.

nerves, the cervix by the second lumbar nerve and the vagina by the third and fourth lumbar nerves. The surface areas involved if these organs are diseased will follow the skin area corresponding to the peripheral sensory nerves of the same cord level. Thus any gross disorder of the ovary will cause, amongst other symptoms, diffuse pain in the lower lumbar region, tubal disease will give rise to pain over the lumbo-sacral region, while uterine conditions will give rise to low sacral backache.

Apart from this segmental referred pain, the pelvic viscera, such as the cervix, uterus and ovaries, must have some sensory nerve supply, as any gross disease of these organs gives rise to a deep-seated diffuse pelvic pain.

Before I consider in detail some of the gynæcological conditions which may cause low back pain, two important factors which have a bearing on the severity of the pain should be mentioned. Firstly, any pain due to a pelvic lesion, no matter what its site and nature, is apt to be aggravated during the congestive premenstrual phase of the menstrual cycle. Secondly, it is important to remember the great variation in the threshold of pain. Probably the greatest difficulty with backache is the assessment of the severity of pain. This is subject to great variations, not only between individuals, but also in the same individual. When a person is subjected to physical fatigue or mental distress, she is much more sensitive to pain than when she is rested and in a happy mood.

As low back pain from gynæcological causes is secondary to some disease or lesion of the female genitalia, we will now consider what diseases and pathological conditions cause this symptom. Inflammatory neoplastic conditions and displacements of the uterus, Fallopian tubes and ovaries, and inflammatory and neoplastic disease of the cervix, vagina and vulva and pelvic connective tissue may all give rise to low backache.

Displacements of the Uterus.

Retroversion takes pride of place in the ætiology of this condition, and although there is not the slightest doubt that a very large proportion of cases of simple uncomplicated retroversions are not complicated by backache, the condition can and does at times cause backache. Retroversion occurring after childbirth, and complicated by subinvolution of the uterus and laxity of the uterine supports with free lymph in the pouch of Douglas, usually gives rise to low, diffuse, bilateral sacral backache. The backache usually increases in severity with fatigue and towards the end of the day, and is relieved only by rest. The third variety of retroversion complicated by pelvic colon and other viscera, practically always gives rise to severe, diffuse, low sacral pain. It is usually severe enough to require operative treatment.

If there is doubt about the cause of the backache in patients suffering from retroversion, it is usually wise to precede operation by the trial of a vaginal pessary as a test of whether or not the backache is caused by the displacement. This, of course, is applicable only when the retroversion is mobile and can be reduced.

Another simple test (although not so reliable) is to note whether the pain disappears when the patient rests in the recumbent position. Rest usually relieves backache secondary to retroversion and prolapse.

Pelvic Inflammations and Infections.

Salpingitis, pyosalpinx, hydrosalpinx, salpingo-oophoritis, tuberculous infections and parametritis, and any other type of pelvic inflammation usually cause backache. Other characteristic and more conspicuous symptoms, such as severe lower abdominal pain, menstrual disturbances, pyrexia, etc., are also present. The pain in these inflammatory conditions is the referred variety, and it is present in the lower part of the abdomen, usually below the umbilicus, as well as in the lower part of the back.

If these inflammatory conditions spread to the retroperitoneal space or extend over a wide peritoneal area, the backache will extend from the lower lumbar region to the coccyx and down the back of the buttocks and thighs. It is usually very severe, and it is not relieved by rest in bed.

Infections of the Cervix and Ectropion.

A few years ago, backache was considered to be one of the commonest symptoms of infections of the cervix; but recently it is believed that only acute infections cause backache, and then only when the utero-sacral ligaments and parametrial tissue become involved in the infection. Chronic cervicitis and ectropion frequently cause pain and tenderness in the region of the parametria, but seldom cause backache.

Acute infections of the cervix may also give rise to acute fibrositis of the spinal muscles. If this occurs, the back pain is sudden in onset, agonizing in character, but usually of short duration, and disappears as the acute infection subsides. The ætiology of this condition is similar to that which may occur secondary to a septic focus anywhere in the body.

Endometriosis, Chocolate Cysts, etc.

Endometriosis, especially if it involves the peritoneum, causes a continuous dull ache in the lumbo-sacral region. The pain usually increases in severity just before and with the menstrual periods, and as a rule the severity of the pain will depend on the area of peritoneum involved, and on whether or not the ovaries and pelvic viscera are involved and fixed. If the recto-vaginal septum is affected, the symptoms may be suggestive of carcinoma of the bowel. Other symptoms, such as dysmenorrhœa, dyspareunia and infertility, are also usually present and help in the differential diagnosis.

Pelvic Neoplasms.

Fibroid tumours which become impacted in the pelvis, and fibroid tumours large enough to cause lordosis or alteration in the patient's posture, may cause low back pain of the referred variety, or backache secondary to ligamentous or muscular strain.

Rapidly-growing ovarian cysts also cause low back pain secondary to distension of the capsule of the cyst.

Malignant pelvic tumours usually cause intense and severe backache, from involvement of the pelvic nerves and metastases in the bones of the pelvis. The backache is often agonizing, and tends to increase in severity during rest and at night.

Post-Operative Backache.

Post-operative backache commonly occurs after gynæcological operations requiring the use of the lithotomy position. It really should not be included as secondary to pelvic conditions, as it is caused by strain of the ligaments of the sacro-iliac and lumbar joints. It may persist for months, and back manipulation may be necessary for its cure.

Post-operative backache may also occur after hysterectomy or after extensive pelvic operations. It may be secondary to infection of the vaginal stump and cellular connective tissue, or to involvement of the sacro-iliac joints, or possibly to tight suturing of the middle supports of the uterus (utero-sacral and transverse cervical ligaments). If it is due to infection, it usually subsides in a few weeks without treatment; but otherwise manipulation of the back and pelvis may become necessary for its relief.

Prolapse of the Uterus.

Prolapse of the uterus is another displacement which frequently causes low, diffuse, lumbo-sacral backache. The backache is usually relieved by rest in the recumbent position, and becomes increasingly more severe as the day progresses. The backache is probably secondary to a drag on the over-stretched middle and lower supports of the uterus, although pelvic venous congestion may play a part. However, backache is not present in all cases of prolapse, and it frequently disappears when the prolapse becomes complete.

Conclusion.

In conclusion, there are many gynæcological conditions which I have not mentioned that may cause backache; but often the severity of other predominant symptoms overshadows the back ache. Finally, it is as well to remember that low backache in women as a single symptom is seldom secondary to pelvic disease. The ætiological basis in such cases is practically always an orthopædic condition, and it is as well to refer those patients to our orthopædic colleagues for their diagnosis and skilled treatment.

BACKACHE IN WOMEN—UROLOGICAL ASPECTS.[1]

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BEFORE discussing urological causes of backache in women, I should like briefly to join forces with Dr. Salisbury by saying that orthopædic lesions (major or minor) are, I am sure, the most common causes of women's backache. It may appear that in saying this I am shifting the responsibility for the investigation and treatment of a difficult problem or patient to another speciality; but Dr. Salisbury has made a good case for regarding backache as rarely due to gynæcological disease. So, too, I hope to support my contention that few backaches in women are due to urological disease; but, of course, some of these backaches are most certainly due to lesions of the urinary tract. Moreover, urinary tract disease as a whole is much more common in the male than in the female, with the exception of that ever-present and widespread problem in female patients—namely, inflammatory urinary tract disease in its various forms, of which the most common is recurrent acute cystitis and pyelonephritis. This means that urinary tract calculous disease is less commonly seen in the female than in the male, and renal calculus is a relatively uncommon lesion in women and therefore an uncommon cause of female backache.

Urological diagnosis with its array of special investigations always appears extremely accurate and seems to leave little room for doubt in diagnosis. However, it must be confessed that even though urinary tract diagnosis is perhaps more certain than is diagnosis in most other systems, some individual problems of backache or renal pain are not easily solved, and it is not always easy to exclude urinary tract causes of pain. With regard to the actual diagnostic measures used, although cystoscopy and retrograde pyelography are sometimes indicated in the study of a patient with backache, modern intravenous urography (made with 70% organic iodide contrast media) does not often need to be supplemented by retrograde pyelography. It is always pleasing to reflect that the technical aspects of intravenous urography have improved so much over the last few years that the patient is spared much of the inconvenience and discomfort of instrumental pyelography; but some indications remain for instrumental pyelography in studying renal pain, etc. These are (*a*) the non-functioning kidney, (*b*) the positioning of a supposed ureteric calculus, and (*c*) the case in which the intravenous films are not completely diagnostic—that is, when the pyelogram is not clearly defined for various reasons such as poor renal function or technical errors. The gynæcologist need not be reminded of the value of intravenous urography, as he employs it commonly, not only to investigate backache, but also to help assess many of his cases. For example, the gynæcologist regularly uses intravenous pyelography in assessing patients with gynæcological lesions as far removed as carcinoma of the cervix and ectopic kidney, to mention only a few.

As always, the right approach to the patient's problem is the taking of an intelligent clinical history and a conscientious physical examination. With this approach we shall not confuse, say, the symptoms and signs of renal colic with those of biliary colic, or again with those of an intervertebral disc lesion, for example.

Renal pain is experienced in the tenth, eleventh and twelfth thoracic and first lumbar distribution, but is felt essentially in the costo-vertebral angle. The pain may be dull and constant, or severe, when it may radiate anteriorly and also towards the external genitalia. This pain is, of course, produced by distension of the pelvi-caliceal system or the renal capsule. Although this type of renal pain occurs in patients with acute pyelonephritis (from œdema of the kidney and stretching of the capsule), in polycystic kidney or even occasionally in renal neoplasms, its common cause is acute hydronephrosis, of which in turn the commonest cause is an obstructive renal or ureteric calculus. The pain is characteristically intermittent.

Ureteric pain (eleventh and twelfth thoracic distribution) virtually never exists except in association with renal pain, as acute distension of the ureter is not seen apart from hydronephrosis; that is, both are produced by the causative ureteric obstruction from, say, a calculus.

Bladder pain virtually never produces backache; but some sacral backache is experienced by the patient who has acute retention of urine.

In this place there is little excuse to mention the prostate, were it not a common cause of backache in the male, especially the bony secondary deposits from carcinoma of the prostate. However, I would mention that it is my firm opinion that although one may find pain in the second to fourth sacral distribution in the rare acute prostatic abscess, the syndrome of "sacral backache and pain down the back of the thighs to the ankles"—that is, the so-called backache of chronic prostatitis—is never due to the prostatic lesion itself, but is due to say an orthopædic lesion with or without psychogenic symptoms. Chronic prostatitis is basically a symptomless lesion, although it can account for some male urogenital infections—for example, acute cystitis and acute epididymitis. Moreover, psychogenic symptoms arise in some patients at the very mention of the "prostate", a word which conjures up in many patients' minds a mixed collection of anxieties, from carcinoma to the alleged pain of prostatic surgery, and to preoccupations along psycho-sexual lines, particularly fear of impotence. No doubt a similar pattern of anxieties regarding her internal genitalia can be suffered by the female patient with backache. Chronic prostatitis has been blamed for much low backache, the alleged mechanism being a spread of infection via the prostatic venous plexus to the vertebral venous plexus (the fourth or vertebral venous plexus of Batson). Some have related ankylosing spondylitis and many vertebral lesions to chronic prostatic infection; but to say the least, this hypothesis is unproven. I merely mention this, as female genital tract sepsis has been blamed for similar lesions.

To return to renal pain, the average problem is straightforward—that is, a calculus is demonstrated and removed, or some other painful lesion (a hydronephrosis of whatever cause) is found; but there remains a tough core of patients (usually female) whose pain has all the earmarks of a renal origin, but in whom no objective abnormality is demonstrated. No doubt some of these patients actually do have a renal lesion (a radio-opaque stone is easily missed); others may have an extrarenal lesion (for example, biliary calculi). On occasion, for "nephralgia"—pain from an apparently normal kidney—renal sympathectomy with splanchnicectomy has been practised, but here the results with regard to relief of pain are indifferent. The painful ptosed kidney must be considered here. Fortunately nephroptosis is no longer a common diagnosis. Probably this is because of better general nutrition in our community (perhaps the average asthenic female patient has more perinephric fat than her sister of a generation or more ago), and also because the presence of a palpable right kidney is rightly recognized as a normal finding in a thin female patient. (In fact, sometimes the urologist sees patients who have a palpable

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on April 28, 1960.

ILLUSTRATIONS TO THE ARTICLE BY GEORGE MICHELL.

FIGURE II.

Coronary angiogram showing the proximal phase of coronary filling. (This is serial X-ray exposure No. 1 in Figure I, which occurred at the end of the diastole during which the injection was given.)

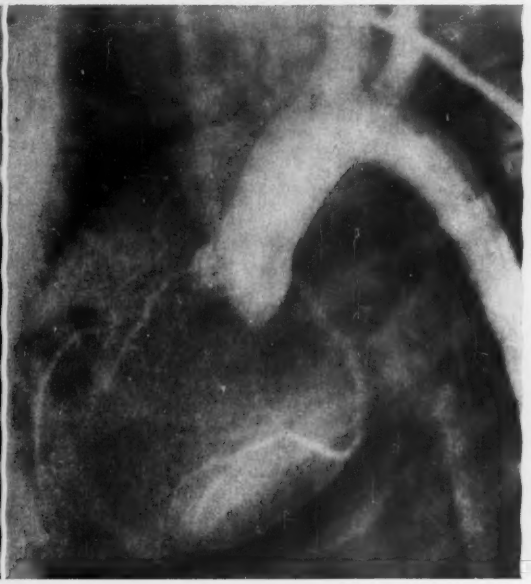

FIGURE III.

Coronary angiogram showing distal filling of the coronary tree with dilution of the medium proximally. (This is serial X-ray exposure No. 6 in Figure I, which occurred at the end of the diastole following the one during which the injection had been given.)

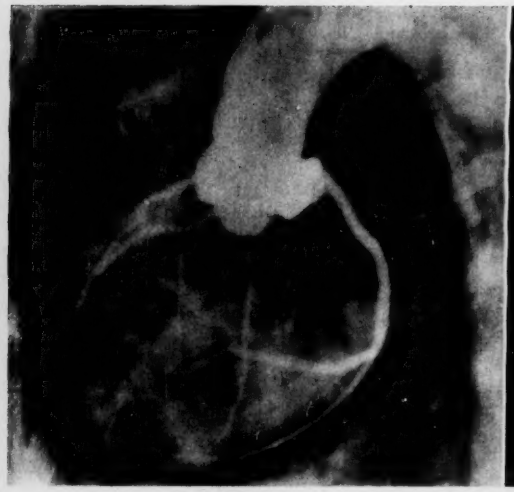

FIGURE V.

Coronary angiogram showing complete filling of the coronary tree. (See Figure IV.)

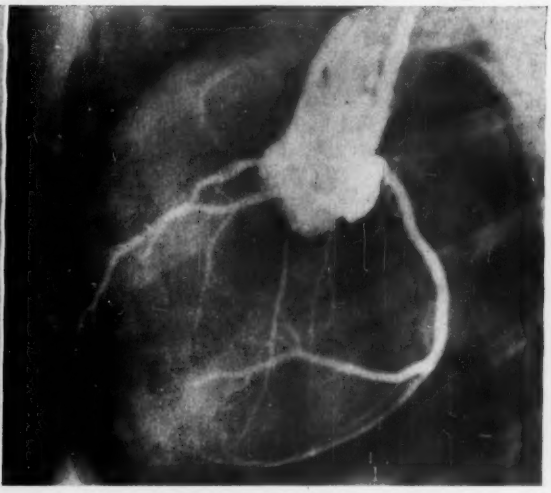

FIGURE VII.

Coronary angiogram showing complete coronary filling. (See Figure VI.)

ILLUSTRATIONS TO THE ARTICLE BY GRAEME SLOMAN AND W. S. C. HARE.

FIGURE II.

Normal major coronary arteries in a patient with aortic valve disease. The measured peak systolic gradient was 60 mm. of mercury.

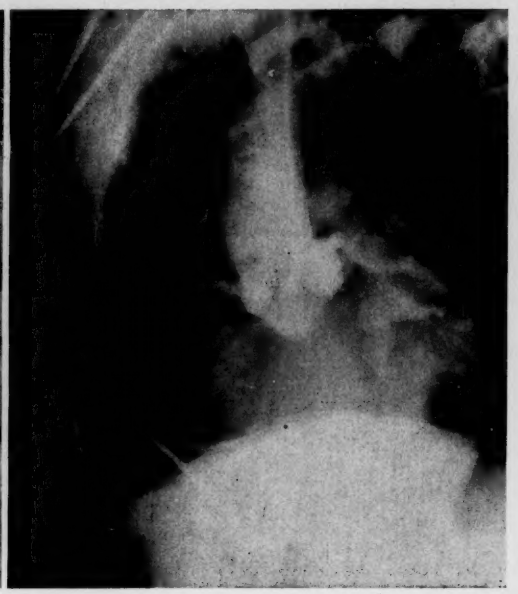

FIGURE III.

A blocked anterior descending branch of the left coronary artery in a patient with aortic valve disease (autopsy confirmation).

ILLUSTRATIONS TO THE ARTICLE BY BRUCE ROBINSON AND RODERICK THOMSON.

FIGURE I.

Barium-meal X-ray examination. A compression film of the antrum of the stomach to show the hypertrophied mucosa, which appears intact.

FIGURE II.

Barium-meal X-ray examination. This film shows narrowing of the antrum of the stomach with thickened mucosal folds, and coarsening of the mucosal pattern, spasm and dilatation in the duodenum and jejunum.

right kidney which has been regarded as normal when indeed a hydronephrosis or other lesion is present. There is no way of making a certain clinical diagnosis here except by radiography.) Surely "nephroptosis" as a diagnosis has gone out of fashion because it has been realized that nephropexy never relieves the patient's pain. So, with better realization of the physiological nature of the mobile kidney, there are fewer radiological reports of "kinked" ureter, and less preoccupation of the doctor and patient with pain arising from a "dropped kidney".

Conclusion.

In conclusion, I would say that urological causes of backache are few, but are always worth remembering. Urological lesions can be diagnosed and treated by not forgetting their existence. "More mistakes are made by not remembering than by not knowing" of a lesion's existence. Here, as always, a painstaking history and physical examination and the free use of intravenous urography, supplemented occasionally by cystoscopy and retrograde pyelography, will usually give the urological solution to the problem.

OBSERVATIONS ON A NEW HYPOTENSIVE DRUG: GUANETHIDINE ("ISMELIN").

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THE ideal drug for the treatment of hypertension has not yet been discovered. Although treatment has become much more effective of recent years, all the drugs have undesirable side effects and in some cases dangerous complications. However, fairly satisfactory control of hypertension with only moderate side effects can usually be achieved by a combination, such as that of a ganglion-blocking drug with reserpine and chlorothiazide.

Recently new drugs have been developed which produce a similar hypotensive effect to the ganglion-blocking drugs by inhibition of sympathetic nervous activity, but without the unwanted side effects of blurred vision, dry mouth, constipation and impotence due to parasympathetic blockade. One of these drugs is [2-(octahydro-1-azocinyl)-ethyl]-guanidine sulphate, or guanethidine ("Ismelin", Ciba—Figure I). This compound was prepared by Mull and his associates in 1957, and pharmacological studies were carried out in the Ciba Research Laboratories (Ciba, 1959, *a*, *b*). Toxicity studies showed a low order of toxicity, and the drug was released for clinical trial in 1959.

We had no clear indication concerning dose, or whether the pharmacological effects observed in the animal were produced in man. We therefore carried out tests to establish a satisfactory dose, investigated the effect of the drug on sympathetic and parasympathetic nervous activity in man and made a trial of treatment with the drug in hypertensive patients. The results of these studies are presented in this paper.

INVESTIGATIONS AND RESULTS.

Effective Dose.

An increasing daily dosage was given to three hypertensive patients (10, 20, 40, 80, 160 mg. to one; 20, 40, 80, 160 mg. to one; 40, 80, 160 mg. to one). Single doses were given to three patients (50 mg. to one, 160 to each of two). One patient was given 100 mg. on four successive days, and 150 mg. on three successive days.

With the increasing dose method, a significant effect did not occur until the daily dose reached 160 mg. It was not possible to determine how much of the effect at this dose was due to cumulation from previous doses. With the single-dose method, apart from a patient who had undergone previous sympathectomy and had postural hypotension without medication, little or no effect occurred from doses as high as 160 mg. With repetition of the same dose, a slight effect occurred from 100 mg. per day for four days, and a moderate effect from 150 mg. per day for three days.

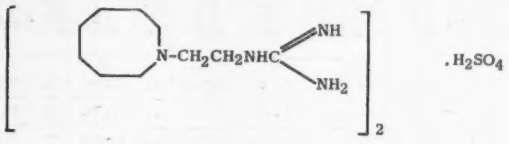

FIGURE I.
Structural formula of guanethidine ("Ismelin", Ciba).

In the light of these findings, it seemed that a single dose up to 160 mg. would be of no use in investigational work, and that 100 mg. per day would be a reasonable dose to use in order to obtain a cumulative effect.

Modification of Autonomic Reflexes.

Method.

Several tests, designed to measure autonomic activity, were performed on eight hypertensive patients who had been treated with a combination of ganglion-blocking and other drugs. These tests were carried out initially two days after cessation of ganglion-blocking therapy and were repeated after two weeks' treatment with guanethidine given as a dose of 100 mg. per day, modified in some cases where the hypertensive effect or side effects were excessive. Treatment with other hypotensive drugs (chlorothiazide, dihydrochlorothiazide, reserpine or hydralazine) used in conjunction with the ganglion-blocking drugs was not interrupted.

Observations were made during the afternoon in a room maintained at a temperature of approximately 22° C. (72° F.).

Tests of autonomic reflex activity comprised the effect on the blood pressure and pulse rate of (*a*) change in posture from the lying to sitting and standing positions, (*b*) exercise, (*c*) cold immersion, (*d*) pressure over the carotid sinuses and (*e*) injection of atropine, and also the sweating response to indirect heating.

Ability to maintain the blood pressure when standing at approximately the same level as when lying, rise in blood pressure and heart rate with exercise, rise in blood pressure from cold immersion, and sweating from indirect heating were considered manifestations of sympathetic nervous activity. Slowing of the heart rate from pressure over the carotid sinuses and rise in heart rate following injection of atropine were considered manifestations of parasympathetic reflex activity.

The methods of performing the tests were as follows:

Posture Test.—The patient lay supine for five minutes, then sat with legs dependent for five minutes and then stood for five minutes.

Exercise Test.—The patient lay supine for five minutes, then performed bicycling exercises in time to a metronome (at 100 per minute) for four minutes, or a lesser period if he was unduly fatigued.

Cold Pressor Test.—The patient lay supine for five minutes, and then the left hand and forearm were immersed in water containing ice (temperature of 4° to 5° C.).

Carotid Sinus Pressure.—After a baseline period of five minutes, pressure was exerted over each carotid sinus in turn for one minute.

Atropine Test.—After a baseline period of five minutes, atropine sulphate (1·2 mg.) was injected intravenously during a period of about one minute. Observation was continued for a further 30 minutes.

Sweating Test.—An alcoholic solution of iodine was painted on one forearm, followed by an emulsion of starch in castor oil. The other forearm was heated in a water bath at 44° C. for 20 minutes. Sweating in the observed

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TABLE I.
Effect of Guanethidine on Autonomic Responses.[1]

Subject.	Before Guanethidine.				During Guanethidine.				Effect of Guanethidine on								Blood Pressure Following Injection of Atropine.		Sweating	
	Lying.		Standing.		Lying.		Standing.													
	Blood Pressure.	Pulse Rate per Minute.	Blood Pressure.	Pulse Rate per Minute.	Blood Pressure.	Pulse Rate per Minute.	Blood Pressure.	Pulse Rate per Minute.	Recumbent Blood Pressure.	Standing Blood Pressure.	Pressor Response to Exercise.	Cardiac Acceleration from Exercise.	Pressor Response to Cold.	Depressor Response to Carotid Sinus Pressure.	Slowing of Cardiac Rate from Carotid Sinus Pressure.	Cardiac Acceleration from Atropine.	Before Guanethidine.	During Guanethidine.	Before Guanethidine.	During Guanethidine.
A	201/111	38	174/113	42	194/120	43	134/95	64	N.C.	Fall.	Dec.	N.C.	N.C.	Dec.	—	Inc.	Rise.	Rise.	+	±
B	214/127	62	194/122	65	188/110	52	141/98	53	Fall.	Fall.	N.C.	Dec.	N.C.	N.C.	N.C.	Dec.	N.C.	Rise.	+	±
C	215/140	56	195/143	76	217/131	42	125/98	70	N.C.	Fall.	Dec.	Dec.	Dec.	N.C.	N.C.	N.C.	N.C.	Rise.	0	−
D	164/98	76	168/107	85	215/112	79	153/100	78	Rise.	Fall.	Dec.	N.C.	N.C.	N.C.	Dec.	Dec.	N.C.	Rise.	+	±
E	169/81	64	170/97	69	162/86	62	134/83	71	N.C.	Fall.	Dec.	Dec.	Dec.	N.C.	N.C.	Dec.	Rise.	N.C.	+	+
F	239/138	56	226/145	56	121/81	56	102/66	68	Fall.	Fall.	Dec.	Dec.	Dec.	Dec.	N.C.	Dec.	N.C.	Rise.	+	0
G	214/136	66	187/143	84	160/92	54	107/72	65	Fall.	Fall.	N.C.	—	Dec.	—	—	—	—	—	—	—
H	218/120	92	198/128	99	204/117	67	153/103	68	N.C.	Fall.	Dec.	Dec.	N.C.	Inc.	Inc.	Inc.	N.C.	Rise.	+	0

[1] In this table, a blood pressure change produced by standing of less than 10 mm. of mercury is recorded as no change. Similarly a difference of less than 10 mm. of mercury in the blood pressure or of 10 per minute in the pulse rate in the responses noted before and during guanethidine therapy is recorded as "no change". In assessing responses, mean blood pressures, taken for convenience as $\frac{\text{systolic}+\text{diastolic}}{2}$, are used. N.C., no change; Inc., increase; Dec., decrease; +, present; ±, weak; 0, absent; −, not recorded; blood pressures in millimetres of mercury, systolic/diastolic.

forearm was manifested by a crop of blue dots due to secretion of sweat from individual sweat glands.

Recording.—Blood pressures and pulse rate were generally recorded at intervals of one minute, the blood pressure being measured with a sphygmomanometer and the diastolic level taken at the disappearance of sound. In the case of the response to carotid sinus pressure, an electrocardiographic tracing was commenced 15 seconds before carotid sinus pressure was started and continued during the period of pressure. In the case of the posture test, exercise test and atropine test, averages of baseline figures and figures obtained at the height of the response were used to assess results; in the case of the cold pressor and carotid sinus tests, figures for the maximum response were used.

Results.

The results are summarized in Table I.

The effect of guanethidine on the blood pressure in the recumbent position was inconsistent, only three of eight patients showing a significant fall. However, the standing blood pressure was reduced in all eight patients. The pressor response to exercise was reduced in most cases (six out of eight). The cardio-accelerator response to exercise was reduced in most cases (five out of seven). The pressor response to cold was reduced in only half the patients. Sweating was reduced in five of six patients tested. These results showed reduction in sympathetic reflex activity, but there was considerable variation between individual patients; sympathetic reflexes were never completely blocked.

There was no consistent effect on the parasympathetic reflex of cardiac slowing from carotid sinus pressure (no change in four of six cases, increased effect in one, decreased effect in one). Treatment with guanethidine did not produce any consistent change in the degree of cardio-acceleration which followed an injection of atropine (decreased response in four cases, increased response in two, no change in one). Before treatment with guanethidine, injection of atropine produced a rise in blood pressure in only two cases out of seven; after treatment with guanethidine, injection of atropine produced a rise in blood pressure in six cases out of seven.

Time of Onset of Action and Persistence on Withdrawal.

In nine cases (including the eight in which autonomic reflexes were studied), dosage was commenced at 100 mg. per day, and during the first fortnight was altered only if this seemed necessary on account of excessive or poor response. In four cases it was maintained at this level, in one it was increased (to 150 mg. per day) on the sixth day, in four it was decreased (to 50 to 80 mg. per day) after several days. A definite hypotensive effect was not apparent until the fourth to seventh day of treatment.

In seven cases (see Table II) the drug was discontinued after treatment for approximately two weeks, and the time of return of the blood pressure to hypertensive level was noted. After cessation of the drug, the blood pressure gradually rose, and in about seven days reached levels approximating those present without sympatholytic drugs. In five cases, treatment with guanethidine was recommenced at a dose of 100 mg. per day. (One patient returned temporarily to his previous treatment with mecamylamine, as the supply position of guanethidine was uncertain. Another patient did not receive any further treatment with sympatholytic drugs, as they did not seem necessary; his blood pressure did not rise to a very high level on stopping ganglion-blocking drugs prior to the trial of guanethidine.) The blood pressure again fell over a few days, and the dose of guanethidine was reduced to one which kept the blood pressure at a level similar to that previously obtained with the ganglion-blocking drug (50 to 100 mg. per day).

Continued Treatment.

Six patients previously treated with ganglion-blocking drugs and changed to treatment with guanethidine have continued taking this drug for periods up to 21 weeks (see Table III).

An attempt was made to judge the effect of guanethidine alone by withdrawing the other hypotensive drugs. It became apparent that best control was obtained with the additional use of the other drugs, and, in the interest of the patients, these were continued. With this régime, the blood pressure control is as satisfactory as with the ganglion-blocking drugs. All six patients are happier on the new treatment.

Side Effects and Toxicity.

Treatment with guanethidine was completely free of side effects due to parasympathetic blockage occurring with ganglion-blocking drugs. These effects—constipation,

TABLE II.

Effect of Guanethidine on Blood Pressures—Short-Term Observations.

Subject.	Age. (Years.)	Sex.	Treatment Prior to Guanethidine Therapy. (Daily Dosage.)	Blood Pressure on Ganglion-Blocking Drugs.[1]	Blood Pressure on Withdrawal, Ganglion-Blocking Drugs.	Blood Pressure Following Course of Guanethidine.	Blood Pressure Following Withdrawal of Guanethidine.	Blood Pressure One Week After Recommencing Guanethidine.
I	43	M.	Mecamylamine, 15·0 mg. Reserpine, 0·75 mg. Chlorothiazide, 1·0 gramme	L. 170/110 St. 135/92	L. 186/113 St. 179/109	L. 162/105 St. 145/95 (9 days, 100–150 mg. per day)	L. 200/120 St. 195/120 (10 days)	(Treatment with mecamylamine recommenced)
A	43	M.	Pentolinium, 840·0 mg. Reserpine, 0·75 mg.	L. 180/110 St. 137/96	L. 212/111 St. 202/114	L. 160/110 St. 140/90 (16 days, 100 mg. per day)	L. 200/110 St. 180/110 (10 days)	L. 190/100 St. 140/90 (100–50 mg. per day)
C	46	M.	Pentolinium, 45·0 mg. Hydralazine, 100·0 mg. Chlorothiazide, 1·0 gramme	L. 175/115 St. 132/91	L. 217/137 St. 207/139	L. 180/119 St. 116/82 (14 days, (100 mg. per day)	L. 210/125 St. 210/125 (8 days)	L. 140/90 St. 130/90 (100–50 mg. per day)
B	46	M.	Pempidine, 30·0 mg. Reserpine, 0·75 mg. Chlorothiazide, 1·0 gramme	L. 198/122 St. 173/110	L. 203/130 St. 190/124	L. 180/108 St. 156/92 (13 days, 100 mg. per day)	L. 245/130 St. 230/120 (14 days)	L. 170/100 St. 130/90 (100–50 mg. per day)
D	53	M.	Pentolinium, 800·0 mg. Chlorothiazide, 1·0 gramme	L. 173/112 St. 136/93	L. 174/116 St. 167/107	L. 178/107 St. 127/84 (13 days, 100–60 mg. per day)	L. 260/120 St. 190/110 (6 days)	L. 193/107 St. 147/87 (100 mg. per day)
E	56	M.	Pempidine, 45·0 mg. Reserpine, 75·0 mg. Dichlorothiazide, 75·0 mg.	L. 160/95 St. 143/90	L. 192/104 St. 171/103	L. 186/95 St. 166/93 (13 days, 100 mg. per day)	L. 170/90 St. 156/90 (7 days)	No further sympatholytic drug given.
F	44	M.	Pempidine, 55·0 mg. Reserpine, 0·75 mg. Hydralazine, 150·0 mg.	L. 165/110 St. 145/103	L. 220/116 St. 218/120	L. 150/73 St. 148/87 (11 days, 100–70 mg. per day)	L. 235/120 St. 195/125 (11 days)	L. 160/103 St. 130/80 (100–50 mg. per day)

[1] L., lying; St., standing; blood pressures in millimetres of mercury, systolic/diastolic.

inability to focus properly for near vision, dryness of the mouth—had been present to some degree in practically all cases, and their disappearance was a source of great satisfaction to the patients. Four men stated that sexual potency had returned with change to the new drug; in three ejaculation was impaired, but this did not worry them.

Faintness on standing was noticed occasionally by some patients, but was not very troublesome. One patient (B) experienced chest pain of the nature of angina pectoris on several days when his blood pressure was lower than that to which he was accustomed. The electrocardiogram was unchanged.

Most patients experienced some looseness of the bowels while taking the larger dose (100 mg. per day). This was largely controlled by "Probanthine" tablets or a bismuth and opium mixture. Diarrhœa ceased to be a problem with reduction in dose.

TABLE III.

Continued Treatment with Guanethidine.

Subject.	Age. (Years.)	Duration of Treatment with Ganglion-Blocking Drugs. (Years.)	Duration of Treatment with Guanethidine. (Weeks.)	Blood Pressure[1] on Treatment with Ganglion-Blocking Drugs.	Blood Pressure[1] on Treatment with Guanethidine.	Present Dose of Guanethidine. (Mg. per Day.)
I	43	6½	16	L. 170/110 St. 135/92	L. 182/106 St. 152/98	60
A	43	4	21	L. 180/110 St. 137/96	L. 173/101 St. 117/84	30
C	46	7	19	L. 175/115 St. 132/91	L. 170/106 St. 120/85	50
B	46	9	20	L. 198/122 St. 173/110	L. 184/106 St. 152/102	50
D	53	7	18	L. 173/112 St. 136/93	L. 182/99 St. 141/95	50
F	44	7½	16	L. 165/110 St. 145/103	L. 172/108 St. 140/93	40

[1] Blood pressures (millimetres of mercury, systolic/diastolic) are average of those at last four attendances during treatment with ganglion-blocking drugs and guanethidine respectively.

Slight transient albuminuria was noted in a few cases, but was of doubtful significance. One patient (I) showed heavy albuminuria (1000 mg. per 100 ml.) when taking 100 mg of guanethidine per day. The dose of guanethidine has since been reduced to 60 mg., and the albuminuria has virtually disappeared. Another patient (F), from whom one kidney had previously been removed on account of tuberculosis, developed albuminuria (300 mg. per 100 ml.) during guanethidine treatment; but in this case there may be another cause for the albuminuria.

The fasting blood urea level has been estimated and routine liver function tests and hæmatological examination have been carried out on patients treated for 16 weeks or more. Hæmatological examination (hæmoglobin value, leucocyte count, blood film) revealed no abnormality.

In four cases the blood urea level was higher, by more than 10 mg. per 100 ml., than that observed at the patient's last review examination several weeks or months previously. One patient gave a positive (+++) response to the cephalin flocculation test, and in three the serum bilirubin level was above 1 mg. per 100 ml. In the absence of a previous investigation of the liver function of these patients, the abnormalities are of doubtful significance. Serum prothrombin, serum alkaline phosphatase and plasma protein levels were within normal limits.

Discussion.

Pharmacological studies (Ciba, 1959, *a*, *b*; Maxwell, Mull and Plummer, 1959; Maxwell, Plummer *et alii*, 1959, *a*, *b*) have demonstrated that guanethidine has a hypotensive effect on the unanæsthetized renal-hypertensive dog, in the unanæsthetized neurogenic-hypertensive dog, and in the unanæsthetized normal dog. It antagonized the pressor action of amphetamine and inhibited reflex pressor responses.

It caused blockade of the contraction of the cat nictitating membrane elicited by preganglionic stimulation of the cervical sympathetic trunk, but did not diminish post-ganglionic potentials. The membrane was rendered hypersensitive to injected noradrenaline and the pressor response to this substance augmented. It was inferred that guanethidine produced inhibition of the release and/or distribution of transmitter substances from sympathetic nerve terminals. Parasympathetic efferent transmission (tested by effect on the heart by vagal stimulation) was not affected. The mechanism of the inhibition of sympathetic activity by guanethidine is not fully understood. There is evidence that, after administration of the drug, stores of noradrenaline are reduced in certain tissues (Sheppard and Zimmerman, 1959).

Since our studies commenced, reports have appeared from several centres on clinical trials of the drug on hypertensive patients (Leishman *et alii*, 1959; Page and Dustan, 1959; Richardson and Wyso, 1959; Frohlich and Freis, 1959; Richardson and Stephenson, 1959; Jaquerod *et alii*, 1959). Treatment has been successfully maintained for periods up to eight months without development of tolerance or toxic effects (apart from a rise in the blood urea nitrogen level in some cases). The drug has proved a potent hypotensive agent, comparable in this respect with the newer ganglion-blocking drugs but without their troublesome side effects due to parasympathetic blockade. The commonest side effects have been postural faintness, mild diarrhœa and failure of ejaculation. Less frequent side effects were nausea, nasal stuffiness and ptosis.

Studies on the cardio-vascular and renal hæmodynamics (Richardson and Stephenson, 1959) have shown a fall in cardiac output, greater in the erect position, and (in most cases) a fall in glomerular filtration rate and effective renal blood flow. A rise in the blood urea nitrogen level was noted in half the patients studied, but only if the pretreatment level was above 25 mg. per 100 ml. The daily maintenance dose has varied from 25 to 300 mg. per day, with an average of about 50 mg. per day.

The value of a new hypotensive drug can best be assessed by comparison with the currently used ganglion-blocking drugs in respect to effectiveness and side effects. Information at present available indicates that guanethidine is equally as effective as the ganglion-blocking drugs, but it is without their side effects due to parasympathetic blockade. Its own side effects are comparatively minor. It produces a more even control of blood pressure; but the slowness of onset and of offset of action may be disadvantageous under certain circumstances. The rise in blood urea level in some cases suggests that it should be used with caution in the treatment of patients with renal insufficiency. Guanethidine represents a distinct advance in hypotensive therapy, but its place in the routine management of hypotensive patients can be established only after further trial.

Summary.

1. Preliminary trials of administration of varying doses of guanethidine indicated that 100 mg. per day would be a reasonable dose to obtain a cumulative effect.

2. Tests of sympathetic and parasympathetic nervous reflex activity were performed on eight patients who had received 100 mg. of guanethidine daily for 14 days. Sympathetic reflex activity was reduced; but there was considerable variation between patients in this respect and sympathetic reflexes were never completely blocked. There was no consistent effect on the parasympathetic reflex of cardiac slowing from carotid sinus pressure. The modification of the response to an injection of atropine was anomalous.

3. With the dose used (100 mg. per day), a definite hypotensive effect did not occur for four to seven days. When treatment was stopped after 14 days, the blood pressure returned to pretreatment level in about seven days.

4. Treatment with guanethidine has been continued for up to five months in six cases. The average maintenance dose was 50 mg. per day. Blood pressure control has been as good as with previous ganglion-blocking drugs, but without their side effects due to parasympathetic blockade. The only side effects have been postural faintness, diarrhœa and failure of ejaculation. A slight rise in blood urea level occurred in four cases.

Acknowledgement.

We wish to thank Dr. G. T. Bassil, of Ciba Pty. Ltd., Basle, for inviting us to undertake this investigation and for making supplies of guanethidine available, and Dr. V. G. Balmer of Ciba Pty. Ltd., Australia, for further help in this connexion. Dr. E. Dodge gave valuable help with some of the tests.

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ADDENDUM.

Since this report was prepared, it has been possible to commence a more extensive clinical trial of guanethidine.

We have given this drug to an additional 25 patients, of whom 23 had previously been treated with ganglion-blocking drugs. In seven cases the drug has been stopped, because of inability to control the blood pressure with a dose up to 100 mg. per day (three cases), because of severe side effects (two cases), or because the blood pressure fell to such a degree that the drug was omitted and was found to be no longer necessary (two cases). In one of the original patients (B.) tolerance to the drug appears to have developed, and it has become necessary to increase the dose. In the other cases, blood-pressure control comparable to that achieved with ganglion-blocking drugs is being achieved without serious side effects or toxic reactions. The average maintenance dose of guanethidine is 50 mg. per day.

We intend to make a further report when the patients in this extended series have been treated for a minimum of six months.

THE DISINFECTION OF HOSPITAL BLANKETS.

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THE control of cross-infection by *Staphylococcus aureus* in hospital wards requires attention to all possible sources of the organism. One source which has recently received much attention is the woollen hospital blanket.

Although proof is lacking that the sterilization of blankets will reduce the cross-infection rate (Blowers *et alii*, 1957), we agree with the suggestion of the *Lancet* (Editorial, January 24, 1959) that blankets should be regularly disinfected as part of an over-all attack pattern on the reservoirs of *Staph. aureus* in hospitals. With this aim in mind we considered chemical treatment, this being possibly less laborious and expensive than heat treatment. Quaternary ammonium compounds had been thoroughly investigated, but, whilst sterility of the article at the end of the laundry process seemed assured, any lasting sterility was questionable. Despite this, some manufacturers had claimed that processing with their product effected sterility lasting beyond the laundry process. Chlorhexidine ("Hibitane") was reputed by some trade magazines to endow the blanket with sterility, lasting from "two to six weeks", or to make the blanket "self-sterilizing". In view of these latter claims, it was decided to test chlorhexidine as a product endowing the blanket with some persisting sterility following laundering. When this method failed, investigation of formalin vapour as a disinfecting agent was pursued. This was not in any sense a new process; but by a somewhat different usage a satisfactory result in terms of time and economics was achieved.

Method.

Chlorhexidine Digluconate Impregnation.

Bed curtains, counterpanes, pillow-slips and blankets were washed by routine laundry methods, save that chlorhexidine digluconate (1:40,000) was added to the final rinse water. These textiles were then dried in the normal way. Two beds in a four-bed ward were made up with these textiles, whilst the corresponding two beds were made up with normal "laundry clean" textiles.

The textiles on both the treated and control beds were sampled by the single, direct contact method of Rubbo and Dixson (1960). The samples were taken 24, 48 and 72 hours after the introduction of the textile into the ward. Egg-yolk medium was used to antagonize the "Hibitane", and the plates were incubated at 37° C for 48 hours.

Next, the final rinse of chlorhexidine digluconate was increased to 1:100 concentration and the organism build-up was followed from the moment of drying to 72 hours.

Formalin Treatment.

The object of this investigation was to disinfect blankets by a process which was both inexpensive and rapid; nonetheless, this process had to be effective against the organisms commonly found in hospital cross infection—namely, *Staph. aureus*, *Proteus*, *Pseudomonas pyocyanea* and the enteric bacilli.

Initially, a room of 1000 cu. ft. capacity was sealed off, with the use of sponge-rubber seals and a screw-down door, and blankets were hung in it vertically from ropes near the ceiling in the same way as washing hangs from a line. The temperature of the air in the room was raised to at least 70° F. by means of two radiators, and a conventional fan was the source of air circulation. The relative humidity in this room was raised to between 80% and 90% by spraying the walls, floor and blankets with a fine spray of warm water.

Formalin vapour was generated from commercial formalin (containing 10% added ethyl alcohol to reduce polymerization) heated in a metal container on an electric hot-plate. One pint of formalin was used for any one treatment (M.R.C. Report, 1959).

In the early experiments the blankets were exposed to the vapour for two hours, but subsequently the exposure time was reduced progressively to fifteen minutes. As the average colony counts after 15 minutes' exposure were not appreciably higher than those after two hours, we decided to adopt 15 minutes as our exposure time.

Contact sampling suggested that there was some "carry-over" of the formalin on to the agar plates, so the method of sampling adopted in this series was on to 6% blood agar plates by the modified percussion technique of Rubbo and Dixson (1960), initially described by Puck *et alii* (1946). Colony counts were made after 24 hours' incubation at 37° C.

Blankets used in these tests were taken at random from ward beds, where they had been in use for at least three consecutive weeks.

As the size of the room used in the previous experiments precluded the use of many blankets at any one time, it was decided to seek a larger chamber. The Chemical Division of the Defence Standards Laboratories, Maribyrnong, kindly allowed us to use their gas chamber. This was a sealed room of 100 cu. metre capacity with adjustable heat and humidity, an internal air-circulating system and an exhaust-fan system capable of exchanging the air in the chamber once every four minutes. Intake of near-sterile air was achieved by placing a battery of seven ultra-violet tubes over the source of air to the chamber (an aperture of 1 sq. ft.); the resultant intake of air showed only *Bacillus* species, and in all our tests no other organism was demonstrated as passing the ultra-violet filter.

Blankets, up to 24 in number, were hung full-length from ceiling ropes and placed approximately one foot apart. Blankets packed in laundry trolleys were also placed in the chamber, but the experimental results on these were found to be unpredictable, so exposure of the total area of the blanket was considered desirable.

The temperature of the chamber was brought to at least 70° F., but not more than 80° F.; humidity was raised to at least 90%, a steam jet being used as the source of

water, and the internal air-circulating system was commenced. Next, 3·6 pints of formalin plus 10% ethyl alcohol was vaporized on four conventional hot-plates. Fifteen minutes' exposure to the gas was allowed, and then the exhaust system was set in use. The blankets were sampled by percussion technique immediately before exposure to the gas, and to minimize any time error, gas masks were donned and the blankets were sampled at the end of the 15 minutes' exposure to the formalin treatment—that is, while the chamber was being cleared.

Results.

In our experiments, we found that the use of the final rinse of "Hibitane" in concentrations of either 1:40,000 or 1:100 conferred no lasting sterility. The textiles treated came from the laundry "sterile", but no more so than those subjected to contemporary laundry processes as exhibited by the Central Linen Service of the Royal Melbourne Hospital.

Table I compares the "build-up" of organisms on textiles treated with "Hibitane" (1:40,000) in the final laundry rinse, and those on laundry-clean textiles. The contact method of sampling was used, and the figures shown represent an average of the total on two beds in each case.

TABLE I.

Comparison of Organism Build-Up on Textiles Treated with "Hibitane" (1: 40,000) and Laundry-Clean Textiles, Using Contact Plate Technique.

Textile.	Average Number of Organisms Isolated from Two Beds.					
	First Day.		Second Day.		Third Day.	
	Treated.	Untreated.	Treated.	Untreated.	Treated.	Untreated.
Curtain ..	9	35	11	31	18	34
Counterpane	12	3	640	350	570	490
Blanket ..	3	8	27	15	23	48
Pillow-slip	75	8	1000	175	1200	1100

It is readily apparent that this treatment initially provides a textile which is just as easily contaminated as the normal laundry article. Further, the treated textile in no way withstands ward contamination.

Table II records a similar experiment using textiles treated with a final rinse of 1:100 "Hibitane" solution; that is, the concentration of the antibacterial agent has been increased 400 times. Again, the results show that even in this strength the antibacterial agent is not capable of exerting its bactericidal effect. There was no doubt of its being present, as the textiles presented a rigid feel to the hand, and small crystals of the "Hibitane" salt could be seen amongst the fibres.

TABLE II.

The Build-Up of Organisms on Textiles Treated with 1 : 100 "Hibitane" Solution Using Contact Plate Technique.

Textile.	Average Number of Organisms Isolated from Two Beds.				
	Immediately.	At 3 Hours.	At 24 Hours.	At 48 Hours.	At 72 Hours.
Curtain ..	8	31	100	40	40
Counterpane ..	41	>400	300	>400	>400
Blanket ..	43	40	57	100	100
Pillow-slip ..	35	142	200	175	150

Table III shows the results of the initial formalin treatment in the small sealed room. The results are reported as an average colony count of two blankets in each case. This treatment resulted in a percentage kill of 98%, 92% and 88% on the three occasions. The percussion method was the sampling technique used.

Table IV shows the results of formalin treatment of 86 hospital blankets, all of which had been in use for at least three weeks. Percussion was the method of sampling, and the gas chamber was the *locus operandi*. These tests were performed in four batches, and the table refers to the average colony counts on each occasion. The total average kill is 91·3% after 15 minutes' exposure. When surviving *Bacillus* species are removed from the total, the average kill is 96%.

TABLE III.

The Formalin Treatment of Six Blankets in the Small Room, Exposure Time 15 Minutes, Percussion Sampling Technique.

Number of Blankets.	Average Count Before Treatment.	Average Count After Treatment.	Percentage Kill.
2	425	9	98
2	325	26	92
2	250	30	88

Discussion.

Reports of infection in which the blanket is regarded as a possible source of pathogenic staphylococci are becoming more common (Frisby, 1957; Schwabacher *et alii*, 1958; Caplan, 1959). Other investigators have failed to detect a decrease in the cross-infection rate when sterilized blankets were used (Clarke *et alii*, 1954; Shooter, 1958). Gillespie *et alii* (1959) suggest that the answer to hospital cross-infection probably lies in attention to more than one object at any one time—for example, blankets, nasal carriers, crockery, etc. They found that this widely-based approach to the problem achieved the desired result.

TABLE IV.

The Formalin Treatment of 86 Blankets in the Gas Chamber, Exposure Time 15 Minutes, Percussion Sampling Technique.

Number of Blankets.	Average Count Before Treatment.	Average Count After Treatment.	Percentage Kill.	Percentage Kill Less *Bacillus* Species.
20	200	20	90	95
21	197	9	95	98
21	289	34	88	94
24	172	8	95	97

Nonetheless, unless hospital blankets are visibly soiled, convention has it that they are usually aired and stored until required again, or, even worse, simply left on the bed for the next patient to use. In either event, the blanket, be it wool or cotton, remains to act as a reservoir of organisms in the ward. Because of this, some form of regular disinfection is not only desirable but obligatory.

Small-scale laboratory tests in this hospital showed that a suspension of *Staph. aureus* dried on glass had no organisms surviving after one week; on cotton, the organisms were not recoverable after two to three weeks; on the other hand, organisms on woollen blankets were still viable after five weeks in one test and 11 weeks in another. These figures are not included to indicate the limit of survival, but merely reflect the number of samples available for daily testing. Schwabacher and Salsbury (1958) found organisms alive on wool after 30 days, but none on cotton after seven days.

It behoves us now to consider the existing methods of blanket disinfection, which fall into two broad categories —(*a*) wet processes, which include chemical disinfection and boiling, and (*b*) dry (gaseous) processes, which use ethylene oxide or related compounds and formalin vapour. All wet processes require shrink-resistant blankets for success on an institutional scale, and although this

presents no problem with new purchases, the same does not hold good for existing stocks of blankets. Again, laundering is a relatively expensive process. The charge for washing a blanket in an Australian commercial laundry is approximately 2s. As most hospital blankets are not soiled on the discharge of the patient, because they are protected by both the counterpane and the uppermost sheet, weekly laundering appears an unjustified expense. For such unsoiled blankets dry sterilization meets most bacteriological requirements. Soiled blankets must obviously be sent to the laundry, where the washing method used should include a bactericidal treatment.

Wet Processes.

Chemical Additives.—"Fixanol C" and "Cirrasol OD" and other quaternary ammonium compounds are effective so far as immediate sterilization of the blankets is concerned; but lasting sterility, as claimed by some authors, is questionable (Rountree, 1946; Gillespie *et alii*, 1958; Marsh, 1958; Frisby, 1957; Blowers and Wallace, 1955). "Hibitane", used in the final rinse in laundering textiles, at a concentration of 1:40,000, has been recommended by some commercial journals. In fact, in our experiments the concentration was increased some 400 times, a 1% solution being used in the final rinse, but without effect. Thus, on a cost basis alone, it is doubtful whether a final "Hibitane" rinse presents any advantage over usual laundry methods.

Boiling.—This is a practical and effective process for disinfecting blankets, provided that a specially selected detergent is used (Cunningham, 1956; Pressley, 1960). But routine boiling of blankets by a central linen service implies both collection and transportation from the hospitals concerned to the central unit; the use of a special boiling technique with detergents; drying and airing; individual packaging of the "sterile" blankets; and finally retransportation to the hospital whence they came. In all, it is undoubtedly an expensive process.

Dry (Gaseous) Processes.

At present, the following three gaseous methods of disinfection are available.

1. Ethylene oxide. This compound is not readily obtainable in Australia, but has been stated to disinfect blankets when used in a concentration of 10% during an overnight treatment (Kaye, 1950).

2. Propylene oxide. This gas behaves in a manner similar to ethylene oxide, and in fact is used to sterilize blood-transfusion and laboratory equipment in this country.

The factors against the general use of these gases are their cost, their explosive nature, the need for an autoclave and the unnecessarily prolonged time required to achieve sterility.

3. Formalin vapour. It is our contention that, in all respects, it is simpler, cheaper and best for the individual hospital to treat its own blankets, using formalin vapour as the bactericidal agent. This in no way clashes with the boiling process described earlier, which we consider to be complementary to the formalin treatment.

Nordgren (1939) has shown that the bactericidal action of formalin vapour increases with temperature and humidity. Gillespie and Alder (1957) reported satisfactory sterilization of blankets using formalin vapour in an autoclave where a preliminary vacuum was created, facilitating penetration of the vapour. In this instance, after one hour's exposure to the vapour, it was found that 95% of the organisms were killed, the bulk of the survivors being spore-bearing aerobes. Caplan (1959), using the same method, obtained similar results. In addition, he noted that in over 1000 cases there was no evidence of either damage to the blanket or sensitivity in the patient.

The formalin treatment on the limited scale performed in the sealed room (Table III) reduced the average total organism count by 98%, 92% and 88% on three consecutive occasions. No *Staph. aureus* survived the treatment. As these blankets were taken out of the treatment room for sampling purposes (compare tests in gas chamber, Table IV), some recontamination from the air may have occurred.

However, the tests conducted in the gas chamber gave an average total reduction of organisms of 91·3% after 15 minutes' exposure to the formalin vapour using high temperature and humidity. If one removes surviving *Bacillus* species from these figures, the average reduction of organisms becomes 96%. Even when blankets artificially contaminated with both *Staph. aureus* and *Ps. pyocyanea* were used, neither of these organisms survived the treatment.

It is not in any way suggested that the formalin treatment confers lasting sterility on blankets—it is doubtful if any known process does (Rubbo, Stratford and Dixson, 1960)—but it has the advantage of being both inexpensive and easily controlled. The design of a suitable unit for any hospital is not difficult to envisage, and ideally we believe that blankets should be treated at least once a week. Moreover, whenever a patient is discharged from hospital, the next patient in the bed should be received into treated blankets, and should not merely inherit those of the man who went before. We recommend that after treatment blankets should be wrapped in sterile plastic envelopes and returned to the general ward or hospital store; but it must be emphasized that blankets soiled with discharge from wounds, fæces, etc., or obviously dirty blankets, should be sent to the laundry for boiling or other comparable sterilization processing.

Summary.

1. A review of the literature on disinfection of blankets is presented.

2. Experiments using "Hibitane" in both 1:40,000 and 1:100 concentrations in the final laundry rinse are described. No lasting sterility resulted in either case.

3. Experiments using formalin vapour to treat 92 used hospital blankets in the presence of high humidity and controlled temperature are described. The average reduction of organisms (less *Bacillus* species) is 96% by this method. The time of exposure to the vapour was 15 minutes.

4. The conclusion is reached that it is practicable to treat all hospital blankets in use at least once a week by this method. However, obviously soiled or dirty blankets should be referred for laundry treatment.

Acknowledgements.

Our thanks are due to Mother Mary Dorothea, R.S.C., and Dr. W. Keane, of St. Vincent's Hospital, Melbourne; to Professor S. D. Rubbo and Mr. T. Pressley for help and constructive criticism; to Mr. A. J. Roenfeldt and his staff at the Defence Standards Laboratory, Maribyrnong, whose cooperation could not be excelled; to Mr. R. J. Paddock, of Cosmic Sales and Distribution Pty. Ltd., for supplying the ultra-violet air filter; and finally to Mr. W. Wolfe and Mr. V. G. Stott, of I.C.I.A.N.Z., who supplied us with the "Hibitane". We are indebted to the National Health and Medical Research Council and to the Hospitals and Charities Commission of Victoria for financial assistance.

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Reports of Cases.

INFILTRATIVE EOSINOPHILIA OF THE STOMACH AND SMALL BOWEL WITH ASSOCIATED MACROCYTIC ANÆMIA: REPORT OF A CASE.

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INFILTRATION of various tissues or organs with mature eosinophilic polymorphonuclear leucocytes together with a circulating hypereosinophilia has been described in recent years. Involvement of the lungs has received most attention, but the changes also have been observed in the liver, spleen, lymph nodes, muscles, stomach, small intestine, pancreas, epididymis, skin, bone marrow and serous membranes (Swarts and Young, 1955; Días-Rivera *et alii*, 1954, 1956; Stewart, 1955; Hoffman *et alii*, 1955; Juniper, 1955; Ferrier and Davis, 1957). The pulmonary condition has been variously referred to as Löffler's syndrome, tropical eosinophilia, acute febrile eosinophilic asthma, Weingarten's syndrome and pulmonary eosinophilia or eosinophiliosis; and that of other sites as visceral eosinophilia or descriptively, as, for example, eosinophilic gastritis. Unlike the focal eosinophilic granuloma or polyp, this is a generalized disease, and often more than one organ or tissue is infiltrated in the one subject with symptoms depending on the sites involved. From the frequent association of allergic conditions such as asthma, this disorder is thought to be due to a state of hypersensitivity, and the present trend is to group all phases, variants and aspects under the term infiltrative eosinophilia. The onset of symptoms may be acute or else insidious with malaise and loss of weight. Common clinical features are fever, asthma and other allergic manifestations, gastro-intestinal symptoms, enlargement of lymph nodes, liver and spleen, and loss of weight. There is increase in eosinophilic elements in the bone marrow, and also circulating eosinophilia which may be of gross degree. The erythrocyte sedimentation rate is raised and the serum globulin content increased, and often there is albuminuria and the radiological findings in the lungs are abnormal. The duration of the illness may be from a few weeks to 20 or more years, with periods of up to several years between attacks.

According to Barrie and Anderson (1948), gastro-intestinal involvement in this disease was first described by Kaijser in 1937. More recently, Swarts and Young (1955) reviewed this aspect, and found the distal part of the stomach and upper part of the small intestine the most commonly involved portions of the tract, with associated vomiting, diarrhœa, epigastric pain, abdominal tenderness and loss of weight. On examination of the tissues they found a dense infiltration of the muscular layer with mature eosinophils, which were most concentrated in the perivascular areas. The subperitoneal layer was infiltrated to a lesser degree, but the submucosa was rarely involved to any extent. There was, characteristically, diffuse œdema in the whole circumference of the wall, with marked and constant hypertrophy of the muscle layers in the affected segment—a possible result of chronic partial obstruction. The mucosa usually was intact, although sometimes erosions or even ulcers were present. Barnett and Kazmann (1952) describe a case in which a barium-meal X-ray examination of a tender epigastric mass showed a deformity of the pyloric antrum sufficiently gross to suggest an annular neoplasm. In this case there was submucous infiltration with eosinophilic leucocytes together with extensive collagenous fibrosis. Somewhat similar findings were present in the Queensland patient described by Ferrier and Davis (1957), where gross thickening of the jejunum was due to dense infiltration with eosinophilic leucocytes. A similar state also was found in an enlarged mesenteric lymph node. In this case there was an instructive relief of symptoms following ACTH therapy.

Although no material was obtained for histological examination, the following case appears to be one of this syndrome.

Clinical Record.

The patient, a Jewish housewife from Poland, was first examined by one of us on July 23, 1954, when she was aged 29 years. She complained of attacks of pain and vomiting. The first of these had occurred in Italy in 1951. In the second, which occurred in Australia about 20 months later, eosinophilia was present, but the findings on a barium-meal X-ray examination were normal. Six months later, in a third episode, angioneurotic œdema was present, and histamine-fast achlorhydria was found. When the patient was examined on July 23, 1954, she said that for three weeks she had had vomiting, anorexia with a distaste for meat, pain extending from over the left scapula down to the epigastrium and a burning tongue. On clinical examination, the only abnormal findings were chronic otitis media and scars from infantile "scrofula" on several fingers and on the left thigh. The tongue appeared normal. On the following day, the X-ray findings in the chest and the thoracic part of the spine were normal; but X-ray examination with a barium meal three days later revealed a segment of intense spasm in the pyloric antrum, with associated thickening of the mucous membrane in that area, and marked delay in gastric emptying. In the duodenum and jejunum the mucosal pattern was very coarse, and while there were some areas of spasm, the lumen generally was dilated and contained a large amount of fluid. Transit through the small bowel was very slow. On a further examination after one week, the region of the pyloric antrum still was contracted and straightened. Peristalsis was absent in this segment, and the whole appearance suggested an infiltrative lesion (Figure I).[1] The

[1] For Figures I and II see art-paper supplement.

duodenum and jejunum also still showed contraction and dilatation (Figure II).

At this stage the patient was very ill, and the picture was confused; but with rest in bed and simple anti-spasmodics the symptoms subsided after an illness of six weeks. A further barium-meal X-ray examination in three months showed only intermittent prepyloric spasm, while one nine months after that revealed no abnormality.

During 1955, a right tubo-ovarian mass of tarry luteal cysts was removed, together with the appendix. Histologically, neither showed evidence of tuberculosis or eosinophiliosis. At this time the patient was also treated for allergic rhinitis; but apart from these occurrences and the persistently sore tongue, which now had reddened papillæ, she remained well until January, 1958, when she had further pain from the back to the epigastrium and angioneurotic œdema of the face. There was no vomiting on this occasion, but it was present during the next attack; however, a barium-meal X-ray examination on that occasion was normal.

The seventh and most recent episode began on June 1, 1959, with vomiting and pain of the usual distribution. On examination of the patient, a slightly tender right epigastric mass was found. This attack was severe; but it subsided in four weeks with symptomatic treatment, which included the intravenous administration of fluids. On June 18 a blood examination gave the following information: hæmoglobin value, 11·6 grammes per 100 ml.; red cells, 3,000,000 per cubic millimetre; colour index, 1·3; leucocytes, 10,000 per cubic millimetre, of which 5600 were eosinophils. There was some anisocytosis, but few poikilocytes, and no atypical cells were found. The eosinophils gradually decreased, so that on July 2 there were 2888 per cubic millimetre, on August 10, 1750, and on October 17, 680. No cause was found for the eosinophilia. Thus a chest X-ray film was normal, and skin tests with a wide range of foods, stool examinations for parasites and Casoni and hydatid complement-fixation tests gave negative results. In view of the macrocytic hyperchromic anæmia, the achlorhydria and the sore tongue, vitamin B_{12} therapy was begun on June 26, and by August 17 the hæmoglobin value and red-cell count were normal. The reticulocytosis was not as marked as would have been expected in uncomplicated pernicious anæmia, but the glossitis was relieved.

Discussion.

Although no confirmatory histological material was obtained, there seems little doubt that this case is one of infiltrative eosinophilia of the stomach, duodenum and jejunum, as most of the criteria elsewhere described were present. In this case treatment of alimentary symptoms was symptomatic, with analgesics, anti-spasmodics, sedatives and anti-emetics. Hydrochloric acid, though it appeared effective during one attack, was not so in others; neither were various anti-histamine drugs. Arsenic has been the standard therapeutic agent for tropical eosinophilia since its use first was advocated by Weingarten in 1943, and recently diethylcarbamazine has been recommended (Baker *et alii*, 1959). Neither of these was used even empirically in this case, nor was steroid therapy, as the diagnosis was not established until after the beginning of the last remission; but before the remittent nature of the disease was appreciated, surgery had been considered twice, although on neither occasion were true indications present.

The nature of the macrocytic anæmia was not easy to explain, for although the achlorhydria was discovered in 1953, and the glossitis had been present for almost as long, the anæmia was first observed during the last abdominal episode. It had not been present in an earlier examination in 1955. The patient's age almost excluded pernicious anæmia, as did the nature of some of the blood findings. Thus poikilocytosis and anisocytosis, though present, were not marked, nor was the reticulocyte response to specific therapy; and although the white cell count was confused by the gross eosinophilia, there did not appear to be neutrophil leucopenia, nor was hypersegmentation noted. Estren (1957) has pointed out that such a picture is more typical of the anæmia of idiopathic sprue than of true pernicious anæmia. On the other hand, the glossitis, which had persisted through the periods of remission of the abdominal disorder, was relieved only after vitamin B_{12} therapy. A reasonable explanation seems that this young woman, with her glossitis and achlorhydria, was predisposed to develop pernicious anæmia at a later period of her life, and that its onset was hastened by the abnormal gastro-intestinal state resulting from the eosinophilia.

No explanation was found for the distribution of the pain in each attack, which appeared to radiate, as in radiculitis, from the region of the left scapula down to the epigastrium. The history of childhood tuberculosis provided a false clue in the search for a cause for this backache, for the epigastric symptoms and, later on, for the pelvic mass.

Summary.

Infiltrative eosinophilia is a generalized disease that may involve many organs and tissues, and then appropriate local features are added to general ones. These are described, with special reference to those of the alimentary canal.

A case of infiltrative eosinophilia of the stomach and jejunum with associated macrocytic anæmia is described and discussed.

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Reviews.

Cardiac Auscultation: Including Audio-Visual Principles. By J. Scott Butterworth, M.D., Maurice R. Cnassin, M.D., Robert McGrath, M.D., and Edmund H. Reppert, M.D.; Second Edition; 1960. New York and London: Grune and Stratton, Inc. 10" × 7", pp. 104, with 68 illustrations. Price: $6.25.

THE authors of this book are members of the professorial staff of the New York University Post-Graduate Medical School, where for the past ten years there has been available to students a course in auscultation of the heart. It is their opinion that the newer diagnostic modalities in cardiology have in no wise diminished the prime importance of cardiac auscultation. From their experience in teaching classes, they have come to the conclusion that reproduction

of heart sounds through a loud-speaker is less satisfactory than simultaneous listening by each member of the class through individual stethophones. They also have found that simultaneous audio-visual demonstration of the sounds is a technique of very great value, since the reception together of sound by the ear and its graphic pattern by the eye watching an oscilloscope or direct-writing stethograph is much more impressive than their reception separately. The book provides the reader with quite a good mental refresher on the auscultatory phenomena of all kinds of heart disease, and it is illustrated with fifty or sixty stethograms, many of them with superimposed electrocardiograms or sphygmograms. There is satisfactory discussion of the origin of heart sounds and of the factors which modify their perception, including the type of stethoscope and the limitations of the human ear. The book is lucidly written for the most part—and with praiseworthy humility when the authors are unable to explain the means of production of sounds and murmurs. There are a few curious verbal lapses—as, for instance, the definition of a murmur as "the auditory perception of vibrations produced by the flow of blood". Also, for triple rhythm the authors always use the unfortunate term "gallop", which seems to come so readily to physicians' lips in the land of Paul Revere.

Textbook of Gynæcology. By J. H. Peel, M.A., B.M., B.Ch. (Oxon.), F.R.C.S., F.R.C.O.G.; Fifth Edition; 1960. London: William Heinemann, Medical Books, Ltd. 8½" x 5½", pp. 518, with 209 illustrations. Price: 30s. (English).

As is to be expected from the eminence of its author, the fifth edition of this book maintains the high standard of its predecessors. Sound and concise, generally conservative and orthodox in its teaching and expressed opinions, it preserves a nice balance between established fact and theory, and, as is desired in a textbook for students, concentrates on the former rather than elaborating on the latter. In the five years since the last edition, progress in gynæcology has not, of course, been dramatic, and, as the author states, has been "in detail rather than in basic principles". Nevertheless, in the preparation of this new edition the text throughout has been thoroughly revised; but only generally accepted fresh work and new treatments have been included. Furthermore, a brief new section on intersex has been introduced, in keeping with recent advances in knowledge of this important subject.

Following on after the usual formal didactic presentation of the various aspects of the subject, common to most textbooks, there is a useful and informative chapter on the significance of gynæcological symptoms, comprehensive in its scope. Then, as in the previous edition, the book concludes with chapters on general therapeutic measures including contraception, endocrine therapy, physiotherapy, radium and X-ray therapy, pre-operative and post-operative management and finally one on gynæcological operations, which is quite adequate for undergraduate students not concerned immediately with the minutiæ of surgical technique.

This book is commended to students as a common-sense and clear up-to-date textbook, written by an examiner whose teachings approximate very closely to those followed in Australian medical schools, of which the general layout and the presentation of subject matter are excellent. As a comprehensive statement of current English gynæcological teaching or as a reference book for the general practitioner, this volume is extremely adequate and serves a very useful purpose.

The Arterial Wall. Edited by Albert I. Lansing, A.B., Ph.D., sponsored by The Gerontological Society, Inc.; 1959. Baltimore: The Williams and Wilkins Company. 9" x 6", pp. 272, with many illustrations. Price: 82s. 6d.

THIS monograph was sponsored by the Gerontological Society, Inc., and it has nine chapters, each dealing with one aspect of the arterial wall by an acknowledged expert, and a summing-up by Abraham Dury. Each component of the arterial wall is distinguished by the relatively little that is known. Charles A. Woerner's study of the vasa vasorum shows us that the nutrition of the inner two-thirds of the arterial media is dependent upon diffusion from the luminal contents, and in this connexion there is Benjamin Zweifach's study of vascular endothelium, in which he tries to correlate function and structure. Arterial muscle has been neglected in the past, but new directions of study are indicated in the article by Wilfried Mommaerts. Albert Lansing covers the present knowledge of elastic tissue, the origin of which is still unknown. Collagen and ground substance are discussed by William Batchelor and Charles Levene. Mucopolysaccharides which enter into the formation of ground substance in the vessel wall are described by John Kirk, who points out that arterial sulphated mucopolysaccharides with anticoagulant properties should prove a fruitful study. Charles H. Barrows and Bacon F. Chow describe the enzymes of the arterial wall, and an interesting observation is that a similar imbalance in enzyme concentrations exists in aging and in arteriosclerosis. A departure from the usual views of atherogenesis is that of Robert Boucek and Nancy Noble, who direct attention to the lipid metabolism of the fibroblast and connective tissue rather than to the blood lipid level. Whereas the foregoing articles have dealt with only one component of the arterial wall, Albert Lehninger discusses the metabolism of the arterial wall and its morphology and function in relation to the aging process.

In general, this book indicates paths for future investigations, and should prove very useful to anyone interested in any aspect of the arterial wall. The production is good apart from an unusual number of misprints.

The Student and Mental Health, An International View: The Proceedings of the First International Conference on Student Mental Health, Princeton, New Jersey, September 5–15, 1956. Edited by Daniel H. Funkenstein, M.D., sponsored by the World Health Federation for Mental Health, International Association of Universities; 1959. London: H. K. Lewis and Company, Limited. 8½" x 5½", pp. 512. Price: £1 15s. (English).

THIS volume should be available to all who are concerned with student health. Thirty years ago it was possible for at least one prominent educator to assume that "the college has nothing to do with the student; it is only concerned with his mind". Today there is a swing in the other direction; brains on stilts are not enough. The Australian delegate to this conference saw the mental health problem as "possibly our most important single problem". A French delegate remarked that, since recent advances in the care and control of tuberculosis, mental health has become "number one problem" in his country. The British delegate could provide figures for some universities; where there are services in a university, about 15% to 20% of students consult the service for psychiatric help or advice; about 2% have some severe disorder.

Against the background of general recognition of the problem, the cultural variations stand out in sharp focus. To discuss these differences and establish a basis for future study of student mental health and planning of student mental health services was the purpose of this First International Conference on Student Mental Health. The papers, discussions and recommendations have been summarized in a very readable book. It contains several "key" papers—for example: "Late Adolescence" by Erik H. Erikson; "The Use of Group Techniques", by Leo Berman; "Cultural Change and the Student", by Margaret Mead—aspects of national and cultural variations presented by delegates from ten countries, summaries of group discussions and final recommendations of the conference. There is an appendix of delegates' papers prepared for the conference.

There is a fair divergence of opinion, and occasionally a clash of outlook. The following basic questions are raised: What is the province of the psychiatrist or counsellor—"patcher-upper", consultant in disciplinary matters, or educator in mental health? Is failure to be attributed to "work block" or "exam. anxiety" instead of to lack of work or ability? Is a mental health programme a luxury in a university budget? And that hardy perennial: If we have too efficient a health service, do we run the risk of levelling down, of making everyone so well-adjusted that no one will produce original thought or works of art?

The conservative can take heart at Margaret Mead's remark about the "dangers of taking our culturally limited, ready-made mental health preconceptions and spreading them at random around the world". There is in this book a great deal to interest all those concerned in student health and university administration.

Hypnotism for Medical and Dental Practitioners. By A. A. Mason, M.B., B.S., with chapters on hypnosis in Dental Surgery and Obstetrics, by K. Dawson Watts, F.D.S.R.C.S., and S. D. Perchard, M.D., M.R.C.O.G.; 1960. London: Secker and Warburg. 8½" x 5½", pp. 224, with illustrations. Price: 49s. 9d.

DR. MASON'S work in medical hypnosis is well known to the medical profession as a whole, from the interest which was aroused some years ago by his report of the relief of a patient with congenital ichthyosis. To those who are

more closely concerned with medical hypnosis, he is known and respected for his work with The International Society for Clinical and Experimental Hypnosis.

This book is intended for the general practitioner, the obstetrician and the dermatologist rather than for the psychiatrist. The usual techniques of induction are simply and clearly described, and an account of the confusional technique for obsessive patients leads the reader to the important conclusion that patients of different personality type require different methods of induction.

There is a good description of the various sources of anxiety in the patient and of the means of alleviating them. The value of hypnosis in the pre-operative and post-operative phases of anæsthesia is convincingly explained; but we must remember that the ability to produce hypnotic anæsthesia is not in itself an indication for hypnosis in preference to pharmacological anæsthesia. In fact, throughout the book there is a tendency to omit or understate the possible complications of hypnosis.

The author gives a good account of the use of hypnosis in psychosomatic medicine, and the section dealing with skin conditions should be read by all dermatologists. The phenomena of hypnosis are well described, and there is reference to much of the more important recent work in experimental hypnosis.

The chapter on the use of hypnosis in dentistry by K. Dawson Watts is sound. Hypnosis is primarily used to allay anxiety, and local anæsthesia is still used if necessary. However, it would have been wise to give some warning as to possible complications, such as spontaneous abreaction.

The style is easy, and at times almost anecdotal. This in itself might wrongly lead the reader to feel that experimentation with the hypnotized subject is a matter to be taken light-heartedly. In fact, there is a general tendency to over-simplification. Nevertheless, this is a good book, and deserves to be read by all practitioners who are interested in hypnosis.

An Introduction to Congenital Heart Disease. By Leo Schamroth and Fay Segal; 1960. Oxford: Blackwell Scientific Publications. 8¾" × 5½", pp. 128, with 82 illustrations. Price: 22s. 6d. (English).

THIS slim volume contains 112 pages of text and is designed to appeal to the student and general practitioner. Line diagrams are freely used to illustrate anatomical details, physiological disturbances and clinical findings, and reproductions of a number of typical electrocardiograms and X-ray films are also included, so that the letterpress takes up only about half the volume and much of this is in summary form. An introductory section of about 25 pages includes good chapters on embryology and on cyanosis. The characteristic clinical features of the common congenital heart defects are then described, with only passing mention of the more complex diagnostic procedures. A number of the less common abnormalities are described briefly towards the end of the volume.

The authors have planned this book as a guide to the subject, aiming to present their material clearly and concisely, and stressing the practical importance of accurate assessment with a view to surgical correction of these defects. In this endeavour they have been successful; but, as occurs inevitably with a summarized account of a subject, a number of dogmatic statements are made with which other observers would not necessarily agree. For the purposes the authors had in mind, this is probably not important.

For the student or practitioner who wants a clear and concise introduction to the subject of congenital heart disease, this book can be thoroughly recommended.

An Introduction to Human Blood Groups. By Fulton Roberts, M.D.; 1960. London: William Heinemann Medical Books Ltd. 7¼" × 4¾", pp. 88. Price: 9s. 6d. net (English).

ONE eminent worker in human blood groups has suggested that it would be easier to keep abreast of this rapidly developing field if all relevant papers and books were to have the essentials of new findings, if any, printed in red. On this basis there would be no red print in Fulton Roberts' book; but it was not the author's intention to present or discuss any personal investigations. The book is an attempt to bring up to date his earlier short work "The Rhesus Factor", which was published in 1947, and to give a concise and authoritative account of the other blood groups of clinical or genetic importance. In this he has definitely succeeded, and has displayed a scholarly approach to his task which is often lacking in medical literature.

This little book, which is unique in many ways, can easily be read in an evening. It will be an enjoyable and rewarding experience for student and expert alike, and the book can therefore be recommended for anyone who appreciates an authoritative review presented in a concise manner.

The style of this book is lucid and concise, and the interest of the reader, however well informed or ignorant he may be on the subject, is sustained through the 85 pages. There is an absence of that dogmatism which is designed to convey the impression that all we need to know has been discovered; rather, the many unsolved problems apparent to a thoughtful author are frankly discussed.

In an earlier book the author stated that he had decided, as an exercise, to write his account of the Rh factor without illustrations. He has repeated this technique in his new book, but has included several tables. Not everyone will agree with the absence of diagrams, and some would prefer to see more side-headings in the text. Both suggestions would make a very readable work even more readable. The A B O groups, which are unquestionably the most important in clinical medicine and genetics, and which still present many problems, are described last, because the author believes that by doing so he is emphasizing their complexity.

The Handling of Chromosomes. By C. D. Darlington, F.R.S., and L. F. La Cour; Third Edition; 1960. London: George Allen & Unwin Ltd. 7¼" × 4¾", pp. 250 with many illustrations. Price: 30s. net (English).

THIS small treatise on technical procedure, by two leading authorities, contains the details of a wide range of methods used in demonstrating or otherwise manipulating chromosomes. It covers the advances of the twelve years or so since the previous edition, and deals with such topics as equipment, fixation, staining, special treatments, control of mitosis and fertilization, radioautography, photography and description of results. A series of appendices gives full working details. A bibliography of over 650 references is provided, including some not mentioned in the text. Unfortunately it omits some that are mentioned.

To offset the botanical bias of this volume, one would have wished for a chapter on the handling of human chromosomes. Recent spectacular discoveries of variation in chromosome number or morphology in Klinefelter's disease, Turner's syndrome, paramongolism, etc., are based largely on new procedures, including the culture of bone marrow and skin. Such techniques arising from the work of Ford and others are notable omissions from this otherwise comprehensive volume.

For all those concerned with the demonstration and identification of chromosomes, from secondary school level to specialized research teams, this new edition offers invaluable technical guidance.

Treatment of Urinary Lithiasis. Compiled and edited by Arthur J. Butt; 1960. Springfield, Illinois, U.S.A.: Charles C. Thomas. 10" × 6¾", pp. 600, with many illustrations. Price: £8 8s.

THERE has been a need for an authoritative monograph on this subject, and this book comes near to filling the need. The book is a symposium of articles rather than a monograph, and a little more care in editing would have been desirable. Some repetition is offset by the fact that each chapter is more or less complete in itself, but occasional contradictions occur. For instance, on page 245 it is stated that "Morphia does not cause spasm of the ureter or affect it in any way", and on page 370 "No Morphia! It will increase the spasm of the ureter".

There is much more in the book than a review of the management of stone. Facts and theories concerning ætiology and pathology are adequately discussed, and it is, in fact, a good, up-to-date survey of the whole subject of urinary lithiasis—albeit with an American flavour.

The book begins with a history of the treatment of stone. This is good reading, but over long (68 pages) for a book of this size. A good chapter of 70 pages on the care of patients before and after operation would have been more suitable had it been restricted to discussing modifications of standard treatment dictated by the special type of case. These two sections together occupy more than a quarter of the book.

The remainder of the book is composed of series of articles selected to cover the many aspects of management of various

types of stone, and in most cases each chapter has been written by an authority on his subject. Most of these chapters are good, with author's opinions freely expressed, and with practical advice about management. At the end of each chapter is an adequate and often extensive bibliography.

Some of the chapters on operative surgery make a weak point in this book. In particular the twelve-page chapter on the surgical management of renal calculi is poor. Only the standard oblique subcostal incision is at all adequately described and surely it is not always necessary to mobilize a kidney completely in order to remove a stone. An operation for recurrent calculi in a solitary kidney is briefly described: "A large thick flap including all tissue (skin, fat, fascia, muscle, ribs and renal cortex) down to calculus is raised and turned upwards." Although three ribs are cut, no mention is made of the pleura. It is to be hoped that no inexperienced surgeon will be tempted to try this extraordinary procedure.

The index is profuse, but seems to have been taken out by the publisher without editorial supervision; it would be more useful if many of the references were erased.

So long as this book is not purchased in the belief that it is a textbook of operative surgery, it should be most useful to anyone who has to play a part in the management of patients suffering from calculi in the urinary tract.

A Review of the Literature on the Distribution and Epidemiology of Filariasis in the South Pacific Region. By M. O. T. Ivengar; 1959. South Pacific Commission Technical Paper, No. 126. Noumea: South Pacific Commission. 10" x 8", pp. 712. Price: 6s. (sterling).

THIS is a compilation of all available information, including much from unpublished reports, about the distribution and epidemiology of filariases in the South-Pacific region. The volume consists of abstracts, often of a fairly extended nature, arranged in chronological order, a form of presentation which helps in understanding the progress of knowledge of the subject and makes this review one of considerable historical interest. The first reference is to an account of Captain Cook's third voyage. Altogether, 311 different works are quoted or abstracted, and from the material presented it should be possible to prepare quite a complete account of the distribution and epidemiology of filariasis in the region concerned, and to learn a good deal about the history of the development of our knowledge on the subject. This review will be indispensable to anyone working on filariasis in the South-Pacific region, and will be useful to many others interested in tropical diseases generally. An author index will facilitate the search for specific references, but no other cross-indexing is attempted. However, as the subject matter is all closely interrelated, this would have presented considerable difficulties.

The Cell of Schwann. By Gilbert Causey, M.B., F.R.C.S., with a foreword by Sir James Paterson Ross, K.C.V.O., M.S., F.R.C.S., Hon. F.A.C.S., Hon. F.R.A.C.S., Hon. LL.D., Glasgow; 1960. Edinburgh and London: E. & S. Livingstone, Ltd. 8½" x 5½", pp. 132, with 40 illustrations. Price: 21s. (English).

VERY appropriately, this small treatise commences with a short biographical account of Theodor Schwann (1810-1882), co-founder with Schleiden of the cell theory. While views concerning the structure, function and diseases of the epineurium and perineurium remain unchanged, much new information relating to the nature of the endoneurium is presented. For the author, the majority of the so-called endoneurial cells, generally considered to be connective tissue cells, are really Schwann cells. In agreement with the views of Masson, the perineurium of the peripheral nerve trunk becomes a boundary zone, in so far as structures inside the perineurium—that is, the nerve fibres, the Schwann cells and the fibrous and amorphous intercellular substance of the endoneurium—are of neurectodermal origin, while the tissues outside the perineurium are of mesodermal origin. The highly ambiguous term neurilemma is at present commonly applied to the Schwann membrane. This, however, is shown to be part of the protoplasm of the Schwann cell, and it is suggested that if this term cannot be discarded, then it would be best applied to the almost acellular fibrous supporting sheath of the nerve fibre—that is, to the endoneurium, which the author regards as being most probably of Schwann cell origin. The outstanding fact that has been demonstrated by the electron microscope in relation to Schwann cells is that in peripheral nerves the axon is topographically within the cytoplasm of the Schwann cell. This relationship is fundamentally one of invagination, the axon being suspended within the Schwann cell by a double-layered mesentery-like structure termed a mesaxon. However, axoplasm and Schwann cell cytoplasm are completely separated by the plasma (unit) membranes of the two cells, each 75Å thick and separated from each other by a gap 150Å wide. It is now widely held that the laminated myelin sheath of a peripheral nerve is an elongated, spirally wound, zippered-up mesaxon, produced by rotation of individual Schwann cells along the length of a growing axon.

In general this is a well-balanced, attractively written account of a fascinating cell, which currently is assuming increasing significance in relation to views on myelination, regeneration and neoplasms of nerves. The book is adequately illustrated, although several of the electron photomicrographs—for example, Figures 3, 18 and 19—are lacking in clarity. It may be thoroughly recommended to all students of the histology, physiology and pathology of the nervous system.

Blood Transfusion: A Guide to the Practice of Transfusion Within Hospitals. By George Discombe, M.D., B.Sc. (Lond.); second edition, 1960. London: William Heinemann Medical Books Ltd. 7½" x 4¾", pp. 64. Price: 6s. net (English).

THE first edition of this book was published in 1955. It was written primarily for the junior resident medical officer, to acquaint him with the proper practice of blood transfusion within the hospital. The second edition has a similar objective and brings the subject up to date. A short historical introduction is followed by a consideration of the legal responsibilities of those concerned with blood transfusion. The organization within the British Regional Transfusion Centres is outlined, and their responsibilities in the bleeding of donors, the grouping and storing of blood and the investigation of transfusion accidents are discussed. The Australian Blood Transfusion Services may differ from the British Regional Centre in some details, but their basic functions are the same. The author emphasizes that proper organization within the hospital is essential to avoid errors of identity or the administration to patients of incompatible, infected or hæmolysed blood, and he describes a proper organization. The appendices contain brief descriptions of methods for A B O and Rh typing and the antiglobulin test, techniques for cross-matching, a detail of a blank form suitable as a request for blood, and specimen headings for a record card and an index card. The book is clearly written, concise and cheap. It will be of most use to the resident medical officer and other hospital personnel concerned with the administration of blood to patients.

Inheritance of Glioma: The Genetic Aspects of Cerebral Glioma and Its Relation to Status Dysraphicus. By H. J. Van Der Wiel; 1960. Amsterdam, London, New York and Princeton: Elsevier Publishing Company. 9" x 6", pp. 284. Price: 63s. (English).

THIS book is a short study of the problem of genetic influences in primary cerebral tumours. It contains a large number of observations made on families in which a case of tumour was found, together with those on a control series. As the author states, the motive for his work is "an attempt to prove and describe a predisposition for gliomas . . . .". This colours the whole presentation.

The literature regarding the dependence of neoplastic development in general on hereditary factors is discussed, a considerable amount of presumed positive evidence being given. However, several conditions which, though "tumours", are not neoplasms, are included with consequent diminution of validity in the argument. Some discursive information on the glioma group is presented, but hereditary transmission is stated rather than proved.

The chapter on the status dysraphicus ("a disposition for syringomyelis") contains interesting material, and the author's thesis is largely dependent on its association with tumours and its own genetic significance. The criteria for its diagnosis include many minor abnormalities, which, however, most observers would regard as of doubtful relevance.

Even though the author discusses extraneous factors in tumour formation (and the possibility of familial incidence in such circumstances) and some of the experimental work, these are not critically considered. Much emphasis is placed on statistical analysis, and all information which supports the positive view of genetic significance is emphasized.

This book cannot be regarded as a serious contribution to the question of inheritance in the glioma group of tumours; but it does contain a collection of carefully observed material of interest to those studying this problem.

The Medical Journal of Australia

SATURDAY, OCTOBER 15, 1960.

DEVELOPMENTS IN OUTBACK MEDICAL SERVICES.

The great distances and relative isolation of towns, groups and even individuals in Australia's outback pose difficult medical problems and have influenced the character of Australian medical practice in a number of ways. The country practitioner has had to be particularly self-reliant, and this has undoubtedly set the high standard of general practice which is regarded as normal in city as well as country. However, the remote country doctor is no longer as lonely as he used to be, and facilities for medical care available to country people are constantly improving, particularly with the increasing development of aerial medical services. Pioneered by the Royal Flying Doctor Service, which is still the major participant, these services have for some time included also the Northern Territory Medical Service, the Bush Church Aid Society's flying medical service in South Australia, and the aerial ambulance of the Queensland Ambulance Transport Brigade in north Queensland. A number of recent additions can now be noted with satisfaction.

A notable innovation, now a little over a year old, is the Flying Surgeon Service sponsored by the Queensland Government. This is designed to provide surgical facilities for 21 towns in western Queensland. Regular monthly visits are paid to 16 of these, all of which have one or more resident doctors. Towns which are without a resident doctor are visited by the flying surgeon only if the doctor of the Flying Doctor Service requests assistance with a patient who needs a surgical opinion or operation and cannot be moved. The service is provided by a surgeon (at present Dr. Christopher Cummins), an anæsthetist (at present Dr. Powell Thomas) and a pilot, all based on Longreach, which is approximately in the centre of the area. The hospitals in the scattered towns are equipped with routine surgical instruments and materials, but the flying surgeon brings with him whatever else is needed in the way of instruments and equipment. The anæsthetist carries a portable anæsthetic machine. The idea of this service arose in the mind of the Minister for Health in the Queensland Government, Dr. H. W. Noble, as a result of his observations on a tour of western Queensland towns, and a large share of the credit must be given to him for what has proved a sound and acceptable venture since it began to operate on June 1, 1959. A heavy responsibility rests on the doctors in these towns, many of them young and relatively inexperienced and often without a colleague within many miles—sometimes hundreds of miles. Road communication is difficult at most times and can be completely cut off by rain. It is a great boon then to both the doctor and the population to have specialist surgical facilities brought to their doors regularly. The service is essentially consultative, as patients are seen only at the request of another doctor. If the flying surgeon considers a surgical operation necessary, he may recommend transfer of the patient to a larger and better equipped centre, he may perform the operation with the resident doctor as assistant, or he may act as assistant while the resident doctor operates. This system has earned the complete confidence of the private medical practitioner and has made the service acceptable on all grounds. Of its value to the people of western Queensland there can be no question. During the first year of operation of the service, 1531 patients were examined in consultation, and 360 operations were performed, 60 being for surgical emergencies. On over 150 occasions advice on treatment was given by telephone. Emergency calls have been for fractures and other major injuries in about half the cases, for major abdominal emergencies in one-quarter, and for a variety of conditions, including obstetric consultations and foreign bodies requiring endoscopic removal, in the remaining quarter. Undoubtedly many lives have been saved, and much suffering and disability have been averted. The service is, as might be expected, relatively expensive to maintain, and a new aircraft is about to cost a substantial sum, but the money spent is well spent and cannot be begrudged by anyone. We hope to hear more of this service for it would seem the sort of thing that could be adopted in other parts of Australia.

Another development is the recent extension of the Royal Flying Doctor Service to Tasmania, where operations were to begin on September 12, 1960, according to a report in the Melbourne *Age*.[1] With headquarters in Hobart, the service will be manned by medical and first-aid personnel from the Hobart and District St. John Ambulance Brigade as required. The flying portion of the service in the south of the State will be supplied by the Aero Club of southern Tasmania at Cambridge. For the time being, the service to the north of Tasmania and the Bass Strait Islands will be conducted by the Launceston General Hospital medical and nursing staff as required. Flying in the north will be carried out by the Tasmanian Aero Club. The service is to be financed by a Federal Government subsidy, with State Government assistance on certain calls, and by public subscription.

Western Australia also has an official plan for better medical services to its remote northern areas. Announcing the plan recently,[2] the Western Australian Minister for Health, Mr. Hutchinson, said that the North-West and Kimberley divisions of the State would have the services of specialists in medicine and surgery before the end of the year. The new scheme had been recommended by the State Health Council and had the backing of the British Medical Association. Under it, the Health Department would pay the fares of travelling specialists and also a living-away allowance. A specialist would visit the areas concerned about every six weeks. Final details had to be worked out with the B.M.A., but it was hoped to start the new service in November. It would follow closely the establishment of a satellite medical laboratory which was about to be opened at Derby, a small town on the far north-west coast.

[1] *The Age*, September 10, 1960.

[2] *The West Australian*, September 14, 1960.

These are all heartening developments which will be welcomed by doctors and people alike. It is to be hoped that those responsible for each scheme, planned to fit local conditions, will nevertheless seek to learn from the common experience throughout Australia, and so not only see that our outback people get the best medical service possible but also help to enhance Australia's reputation overseas as a pioneer in this sort of thing. In this regard it is pleasing to note that a Flying Doctor Service of Africa is on the way. *The British Medical Journal*,[2] quoting *The Times* of September 6, 1960, states that a pilot scheme is to be launched in Northern Nigeria next year. The secretary of the service is Dr. N. A. Duncan, who has worked as a flying doctor in Queensland. He stated recently that an African flying doctor would maintain wireless contact with mission nurses and African village dispensaries, and would support them by frequent visits by air. Aircraft would not be used for ambulance work. The service hopes to raise £5000 for a preliminary reconnaissance to discover a suitable site for the pilot scheme itself. An interesting further touch in the *Times* report is the statement that about 60 members of Solihull youth clubs have offered to go to Nigeria next year to help to prepare airstrips or install two-way wireless sets and train Africans to use them. Further news of the Flying Doctor Service of Africa will be awaited with interest by many people in Australia, whom we may confidently expect to join us in wishing the Service success.

Current Comment.

VESICO-URETERIC REFLUX.

CHRONIC urinary tract infection in childhood presents a problem which has received increasing attention in recent years, as the serious implications which this often insidious condition holds for the future welfare of the patient have become more fully realized. Vesico-ureteric reflux is one of the commoner causes of the condition in patients in whom there is no obvious urinary tract deformity, and is the subject of two recent articles. In the first of these, J. H. McGovern, V. F. Marshall and A. J. Paquin, junior,[1] discuss vesico-ureteric reflux in considerable detail. These authors first consider the incidence of reflux and come to the conclusion, after a careful review of the published evidence, that it is extremely rare in normal children. They show that reflux is demonstrated very much more frequently in children who attend as urological patients than in those attending hospital for other reasons. On the next question, whether reflux indicates the presence of some significant abnormality of the urinary tract, they state that out of 88 children in whom reflux was demonstrated in their series, 82 had definite urinary symptoms, 84 had pyuria, 81 had an obvious degree of hydronephrosis, and all showed some other evidence of urinary tract abnormality besides reflux, either when originally examined, or during the ensuing months. McGovern and his colleagues conclude that reflux can be considered a useful sign of urinary tract abnormality and state that a test for reflux is usually an important part of a diagnostic study in children.

As regards the detection of reflux, the method favoured by McGovern and his colleagues consists of running in a non-irritating radio-opaque fluid under a pressure of 15 cm. of water. This is usually done with the patient under general anæsthesia; if the patient does not urinate spontaneously, pressure on the abdomen is slowly brought to bear until micturition begins, the object being to avoid applying a back pressure greater than the patient's normal intravesical pressure when urinating. After consideration of the normal valve-mechanism of the ureterovesical junction, McGovern and his colleagues come to the conclusion that many of the important elements which determine the presence or absence of uretero-vesical reflux can be measured. They list the following: length of the intramural part of the ureter relative to its calibre, degree of flexibility in the junctional apparatus, fixation and backing of the lowermost part of the ureter and intravesical pressure. They consider that ureteral peristalsis and tone in the vesical wall have of themselves little influence. It is pointed out that transient œdema about the uretero-vesical junction is capable of causing transient reflux and that in such cases improvement in the patient may occur when reflux ceases. However, it was found that amongst patients not treated surgically, the disappearance of reflux frequently did not constitute an indication of general improvement. On the other hand, among surgically treated patients, a group of 14 children who still showed reflux after their operation showed no improvement in the condition of the upper part of the urinary tract, while 19 children in whom reflux was no longer present showed great improvement in the upper part of the urinary tract. It is noted that reflux can be eliminated without paying the price of increased obstruction.

McGovern and his colleagues then discuss the treatment of vesico-ureteral reflux. They state that their experience with non-surgical management in cases of established reflux in children has been disappointing in spite of the many routines tried. In such cases the condition tends to deteriorate with progressive hydronephrosis and recurrence of infection when drug therapy is discontinued. The removal of vesical outlet obstruction did sometimes suffice to provide clinical relief, but frequently improvement of only the vesical outlet was not sufficient to overcome the whole difficulty. McGovern and his colleagues state that their experience has convinced them that most children with fully developed, non-transient vesico-ureteric reflux usually need not only elimination of the reflux but also a facilitation of vesical emptying if a normally functioning urinary tract is to be achieved. They consider that enlargement of the vesical outlet should be nearly routine, as in many instances the conventional indications for this procedure are not in evidence, though the clinical course of such cases has repeatedly demonstrated the necessity of the procedure. To effect this, McGovern and his colleagues prefer an anterior Y-V plastic operation. They state that 20 selected children with reflux have now been treated according to these tenets, and have been followed up for periods averaging 15 months. A Y-V plastic operation was performed on the vesical outlet in each case. Twenty-eight ureters, in which reflux was demonstrable, were reimplanted, in most cases with a tunnel-and-cuff technique. All patients were finally cured of reflux, a second operation for this purpose being required only once.

Hydronephrosis and/or hydroureter of some degree was associated in all 28 instances. At post-operative follow-up, six months or more later, dilatations were absent in 13 cases, and considered only minor in 15. Pyuria had been totally eliminated in 12 patients, and 17 were completely asymptomatic. These results are not regarded as ideal, and it is admitted that they cannot yet be claimed as permanent, but McGovern and his colleagues state that they do represent an improvement in their experience, and that this suggests that their therapeutic plan has the correct direction.

In their concluding discussion, McGovern and his colleagues pose the question: "What has become of these patients in the past?" Some die before reaching adulthood, but it is suggested that others present in adult life as sufferers from chronic pyelonephritis of unknown ætiology, stone formation often occurring as a secondary result of the infection. It is indicated that there is no evidence as to whether or not it is possible that some of these patients may outgrow their disability, or that regurgitation may cease as a result of post-inflammatory fibrosis.

[2] *Brit. med. J.*, 1960, 2: 875 (September 17).
[1] *J. Urol.* (*Baltimore*), 1960, 83: 122 (February).

In the second article referred to, V. A. Politano[3] comes to very much the same conclusions. Like the previously mentioned authors, he questions the view that vesico-ureteric reflux may occur in children with normal urinary tracts and stresses the importance of cystography as part of a complete urinary tract investigation. He criticizes the tendency to omit this procedure when excretory urograms appear normal, on the grounds that 60% to 70% of children with reflux may be expected to show a normal appearance with excretory urography. He considers that if reflux is suspected but not demonstrated when first looked for, the examination should be repeated on several occasions if necessary. It is pointed out that vesico-ureteric reflux in the presence of infection and progressive ureteric dilatation will lead to impairment of renal function and ultimate total renal destruction. If reflux is demonstrated, conservative measures should first be tried, but if these fail, Politano has found reimplantation of the ureter by creation of a submucosal tunnel a very successful procedure. During the past four years he has used this technique on 26 children with vesico-ureteric reflux. All had a history of recurrent urinary-tract infections, and many showed signs of impaired renal function. Some had already undergone operations to relieve vesical neck obstruction, without lessening of their symptoms. Politano states that in 24 of these 26 patients reimplantation of the affected ureters gave excellent anatomical and clinical results. In 10 of them operation on the bladder neck had either been done previously, or was performed at the same time as the ureters were reimplanted. Politano also notes that he has studied a number of adults with advanced pyelonephritis, in whom free regurgitation from the bladder to the kidneys could be demonstrated, and asks whether these adults had had unrecognized vesico-ureteric reflux when they were children.

The two foregoing papers adduce strong evidence in favour of the efficacy of a basically surgical approach to the problems of vesico-ureteric reflux in children; both agree that conservative measures should first be tried, though McGovern and his colleagues are not optimistic about this approach. However, it should be noted that F. D. Stephens[3] maintains that pooled urine can be eliminated and infection controlled by the conscientious practice of multiple micturition, provided there is no bladder-neck obstruction. Such a conservative approach implies a supposition that if infection is controlled for long enough, the condition will ultimately right itself. These questions can be solved only by the long-term follow-up of patients treated by these various methods.

ROYAL JELLY.

ATTEMPTS to promote royal jelly as a substance with potent but ill-defined therapeutic properties have inevitably given it a somewhat dubious reputation in pharmacological circles. However, it is a substance of very great interest to the biologist, and the present state of knowledge about it has been recently reviewed in a short article by A. D. Dayan,[1] of the Department of Pharmacology in the London Hospital Medical College. The question of what royal jelly is and where it comes from is best answered in Dayan's own words:

> Royal jelly is a milky white highly viscous secretion from the paired salivary glands of the worker (western) honey bee (*Apis mellifera* L.). For the first three days of life it is the sole food of all bee larvæ. After three days, future worker bees are weaned onto honey and nectar, while the future queens continue to be fed on royal jelly, which is in some way responsible for their development into mature female insects. Royal jelly has been known and studied for many years, but its effects on bees, other animals and man have been studied only recently. It contains a number of unique compounds, some with unusual biological properties.

Dayan states that the study of royal jelly has been hampered by the difficulty of collecting an adequate quantity of material and by its instability. In the laboratory, queen bees can be reared from larvæ only if they are fed on jelly which is not more than two hours old. Some of the effects of the jelly which have been described can be demonstrated only after it has been stored for some hours, and Dayan points out that experiments with and therapeutic trials of royal jelly have mostly been carried out on specimens stored for considerable periods, so that the results may be due to substances developing during the aging of the jelly.

Dayan gives details of some of the studies which have been made on the chemical composition of royal jelly. One item which has attracted attention is the remarkably high content of pantothenic acid. In discussing its biological effects Dayan comments that almost the only undisputed biological action of royal jelly is that of producing the differentiation of queen bees from workers. The responsible constituents are unknown, though the high concentration of pantothenic acid has naturally led to speculation as to its possible role in this connexion. On the other hand, if the responsible factors are hormonal in nature, they are probably present in such minute quantities that their identification will be extremely difficult.

Numerous investigations have been made of the effect of royal jelly on other organisms, including mice and men, but many of the results claimed have not been confirmed by other workers. In spite of conflicting reports, there appears to be no good evidence that it has any œstrogenic or gonadotrophic activity in rats or mice. Neither is there any sound evidence of any effect on fertility. The fact that queen bees live longer than workers has attracted the attention of alchemists in search of the elixir of life, but the only helpful suggestion to appear is that the queen bee lives longer than the worker because of her lower energy expenditure. Various experiments have been carried out which indicate a rather complex series of endocrine responses to injections of royal jelly in experimental animals. There is evidence that it has effects on the adrenal glands, on blood sugar concentration and on lymphoid tissues, but it is not yet possible to say how these are caused. Some of these effects are similar to those resulting from corticosteroid injections, but the only reported trial in man in which urinary 17-ketosteroid excretion was measured was inconclusive. Another interesting observation is that royal jelly does not show any bacterial or fungal growth when kept at room temperature in non-sterile containers, and investigation has shown evidence of antibiotic activity against a range of organisms which includes *Staphylococcus aureus*, *Escherichia coli* and *Mycobacterium tuberculosis*, but here again it has not been possible to demonstrate the active principle.

As far as the therapeutic use of royal jelly is concerned, Dayan notes that it has been used mainly on the Continent as a non-specific tonic for people who do not feel quite fit. A variety of reports have appeared, claiming benefit in conditions ranging from prematurity to old age, but Dayan points out that the reports of its effectiveness are based on small numbers of short-term case histories of patients with just those symptoms which are relieved by any new therapy. He comments that the information given is inadequate, and that it seems likely that the value of the treatment was psychological, due only to its novelty and glamour.

It seems therefore that, in spite of much painstaking study in the interval, we know little more about the essential principles of royal jelly than when von Planta made his first analyses in 1888. It is unlikely that royal jelly will ever be taken seriously as a therapeutic substance, but it will continue to exercise a fascination for research workers because, if the intrinsic difficulties could be overcome, the unravelling of its secrets might provide a key to questions of fundamental biological importance.

[3] *J. Amer. med. Ass.*, 1960, 172:1252 (March 19).
[3] MED. J. AUST., 1959, 1:154 (January 31).
[1] *J. Pharmacol.*, 1960, 12:377 (June).
[2] *Nature (Lond.)*, 1959, 183:1270 (May 2).

Abstracts from Medical Literature.

PÆDIATRICS.

Recurrent Vomiting in Children.

C. HOYT AND G. STICKLER (*Pediatrics*, May, 1960) have studied the case records of 44 patients less than 15 years of age seen at the Mayo Clinic from 1945 to 1957 who had the syndrome of recurrent vomiting. Of the 38 patients who replied to a *questionnaire*, 30 had no cyclic vomiting at the time of follow-up. Of the remaining eight patients, there was less than a five-year follow-up in seven. The authors state that evaluation of numerous episodes of vomiting of unexplained cause in a child is usually possible without extensive investigative procedures. The history is extremely important, particularly in relation to the pattern of attacks. Radiological studies of the gastro-intestinal tract as well as a careful neurological examination will rule out the majority of organic lesions that may produce recurrent vomiting, such as malrotation of the mid-gut and intracranial tumours. The cause of the syndrome of recurrent vomiting, while possibly psychogenic, is not definitely known. Electroencephalographic study of 15 of the patients did not suggest any relationship to a convulsive disorder. The success of the extremely variable therapeutic measures suggests that none was specific and that in most cases their value was psychotherapeutic. Some children with the syndrome of cyclic vomiting and associated headache may fit into the category of migraine. Headache was associated with the vomiting in 36% of the 44 patients originally examined; 24% of the 38 patients traced had recurrent headaches after the vomiting episodes ceased; and a family history of migraine was obtained for 25% of the 44 patients. The syndrome of recurrent vomiting tends to be a self-limited disorder terminating before puberty in most instances.

Symmetrical Peripheral Œdema in Infants.

H. EVERLEY JONES (*Arch. Dis. Childh.*, April, 1960) describes seven children, each of whom showed symmetrical peripheral œdema of the lower extremities, and usually of the upper extremities to a lesser degree, which had been present from birth. Pitting was always present and there was no discoloration of the skin or evidence of circulatory disorders. The swelling of the lower extremities presented a rather typical appearance, being most marked over the dorsa of the feet. The œdema tended to disappear from the hands first, and to vanish from the legs in the first few years of life. In three of the five girls examination of the chromatin of the cells in a scraping of buccal mucosa showed the nuclear sex to be male. In the other two girls and the two boys the chromatin pattern corresponded with the morphological sex. The author considers these four to be examples of the symmetrical type of status Bonnevie-Ullrich in incomplete form, while the former three are examples of the more complete form, also known as Turner's syndrome or gonadal dysgenesis. When children show this clinical picture it is advisable to determine the genetic sex by examination of the nuclear chromatin.

Primary Tumours of the Liver in Infants and Children.

H. W. CLATWORTHY *et alii* (*Arch. Dis. Childh.*, February, 1960) state that the majority of primary liver tumours which present as clinical problems in children are malignant and occur in the first two years of life. Such tumours develop in a normal liver, and are not superimposed on a cirrhotic process as in adults. These neoplasms can be classified as (i) tumours derived from liver cells, (ii) tumours derived from supporting cells, and (iii) mixed tumours. Those derived from liver cells are malignant in the vast majority of cases, although the microscopic picture of some is quite benign. Abdominal enlargement due to a palpable abdominal mass is by far the most common presenting complaint. In most instances the mass is in the right upper quadrant and less often in the mid-epigastrium. Without treatment the prognosis is poor in both the malignant and benign varieties. With adequate surgical resection the prognosis in cases of benign tumours is good, and after such treatment normal growth and freedom from liver impairment may be expected. The outlook for patients with malignant tumours, even after operation, has thus far been poor, but with the development of more adequate techniques in achieving wide resections there is reason to believe that success may be achieved. A surgical technique planned to minimize the risks of hæmorrhage, air embolism and bile peritonitis makes removal of these tumours by a resection of either the right or left hepatic lobes a logical and practical procedure.

Immunizing Properties of Measles Virus.

J. DOLGIN *et alii* (*J. Pediatrics*, July, 1960) have carried out a small clinical trial which indicates that it is possible to immunize children with live attenuated measles virus. The susceptible subjects developed either no symptoms at all or a modified measles with fever, leucopenia, and a faint eruption. Koplik's spots were uncommon. These children had no catarrhal symptoms and did not appear "toxic". All of the susceptible children developed a significant titre of neutralizing antibodies. No complications such as middle-ear infection, tonsillo-pharyngitis, bronchitis or pneumonia occurred in any of the cases. The authors stress the urgent need for a measles vaccine, and suggest that measles immunization as a routine procedure may not be far distant. However, many questions still remain to be answered. Will the children remain permanently immune, as in the naturally acquired disease? May encephalitis follow immunization with attenuated virus just as it does on occasion after the naturally acquired disease? Another question that arises is whether children so immunized are contagious for a variable period of time. Measles is transmitted mainly by the droplet method as a result of coughing and sneezing. The authors have been unable to demonstrate the measles virus in naso-pharyngeal swabs. It would seem that since there is an absence of catarrhal symptoms in those immunized with attenuated virus, these children are in all likelihood not contagious.

Early Infantile Autism.

A. H. CHAPMAN (*A.M.A. J. Dis. Child.*, June, 1960) reviews the present knowledge of early infantile autism, a disorder beginning in infancy and characterized by withdrawal from interpersonal relationships, obsessive need to maintain the sameness of the physical environment, preoccupation with things as opposed to people, and various disturbances of language. The behaviour of these children is so characteristic that the diagnosis may be suspected during the first year of life, and a trained observer can usually make the diagnosis with assurance during the third and fourth years. Children with this condition are still frequently misdiagnosed as mentally deficient, deaf-mute, aphasic, post-encephalitic, or organically brain-damaged. Most of these children, as they develop into adolescence and early adulthood, take on the characteristics of a type of schizophrenia in which delusions and hallucinations are not present. The prognosis is guarded, particularly in those children who do not learn to speak by the age of five years. The value of treatment by psychotherapy in altering the course of this disorder is doubtful.

Clinical Manifestations of Primary Hyperoxaluria.

E. G. HALL *et alii* (*Arch. Dis. Childh.*, February, 1960) report eight cases of primary hyperoxaluria occurring in three families, in one of which the parents were first cousins. Patients with this disease usually present in early childhood with multiple, bilateral renal and ureteric calculi which increase rapidly in size and are composed wholly or predominantly of calcium oxalate. Nephrocalcinosis, recurrent attacks of pyelonephritis and hypertensive damage destroy the renal parenchyma, and the patients usually die from renal failure later in childhood. Measurement of the urinary oxalate excretion, which is always raised, is essential to distinguish these patients from other cases of juvenile urolithiasis which do not carry such a grave prognosis. Microscopic examinations of aspirated sternal bone marrow and slit-lamp examination of the eyes for evidence of oxalate deposits have not been helpful in assessing the prognosis in individual cases, and have given no indication of the development of oxalosis (disseminated extra-renal oxalate deposits). It is suggestive that this occurs only late in the evolution of the disease. Although there are no reported cases of primary hyperoxaluria in patients whose urinary oxalate excretion was measured immediately after birth, there are clinical and pathological grounds for suggesting that the underlying error in the disease may be present at that time. The familial incidence of the disease is compatible with its being due to the operation of a rare recessive genetic character. There appears to be no way of preventing the formation of calculi, and the management

of these patients conforms to the surgical practice in other cases of recurrent urolithiasis, the cause of which cannot be removed.

Plasma-Cell Hepatitis.

A. PAGE AND R. GOOD (*A.M.A. J. Dis. Child.*, March, 1960), in a report of six patients with plasma-cell hepatitis, describe the features of this disease as extreme hypergammaglobulinæmia, severe chronic hepatitis, and manifestations of generalized vascular disease, such as skin rashes and arthritis, along with the characteristic histological appearance of extensive plasma-cell infiltration of the liver. The authors believe this disease may be related to hepatitis virus infection or other forms of liver-cell injury in much the same way as rheumatic fever is related to β-hæmolytic streptococcal infection. That is, most persons are able to cope with the infection or injury without developing permanent disabling disease, but a few persons react unusually to the injury. They develop an intensive inflammatory response that then further destroys liver tissue and by doing so increases the stimulus for inflammation. A vicious cycle is set up that ultimately ends with complete destruction of the liver. This syndrome represents only a small percentage of the total cases of post-necrotic cirrhosis, and there is not a sharp dividing line between the two groups. Cortisone therapy proved effective in suppressing all clinical manifestations and most of the laboratory abnormalities of this disease. In addition, improvement in the histological appearance of the liver was demonstrated by biopsy before and during cortisone therapy. In some of the patients serious side reactions to large-dose steroid therapy occurred. In no case were the authors able to cure the patient with steroid treatment, for stopping such therapy was always followed by a recurrence of the disease process.

ORTHOPÆDIC SURGERY.

Necrosis in Fractures of the Femoral Neck in Children.

F. C. DURBIN (*J. Bone Jt Surg.*, November, 1959) draws attention to the serious prognosis in cases of fracture of the femoral neck in children. He notes that this type of fracture is uncommon but that its sinister nature has been realized for many years. The incidence of avascular necrosis of the head and neck of the femur in such cases has been stated to be as high as 50%. The author's paper emphasizes the need for particular care in giving a prognosis at the time of injury in such cases. The notable feature of most fractures of the femoral neck in children is that the site of the fracture is low down in the trochanteric region or at the base of the neck, and therefore well below the entrance of the epiphyseal vessels. The author considers that this injury in the neck of the femur in a child is liable to damage the diaphyseal vessels and that because avascular necrosis occurs this particular blood supply is important. He reports three such cases and demonstrates serious disturbance of the head which occurred as a result of the fracture. The fractures in these cases were undisplaced. It is noted that this special vulnerability of the blood supply of the neck of the femur in children would support a traumatic theory of the origin in Perthes' disease.

Iliac Skeletal Cross-Traction.

G. ALMOND AND E. VERNON (*J. Bone Jt Surg.*, November, 1959) describe a special hook which they use to pass through the ileum in the region of the anterior superior spine to allow controlled cross-traction in cases of fracture dislocation of the pelvis. The authors insert them under local anæsthesia.

Repair of the Sciatic Nerve.

D. K. CLAWSON AND H. J. SEDDON (*J. Bone Jt Surg.*, May, 1960) report the results of analysis of 118 patients treated between 1940 and 1954 with injury of the sciatic nerve or its branches. Operative procedures comprised 105 cases of nerve suture and 13 of nerve grafts. A high percentage of these were the result of war injuries. The assessment of recovery follows the Highet method (1954). Light touch was tested by means of a nylon filament which bent under pressure of one gramme. This was fixed to the end of a bicycle spoke. Pain was tested by means of a sharp needle. Motor response was checked according to the Medical Research Council's grading which runs from 0 to 5: Grade 1 is a flicker of the muscle; Grade 2 is contraction of the muscle, gravity being eliminated; Grade 3 is contracture of the muscle against gravity; Grade 4 is contracture of the muscle against weak resistance; and Grade 5 is contracture against strong or normal resistance. It was difficult to make an assessment of the final degrees of recovery, but it was possible to divide motor response and sensory response into two grades—functionally useful and functionally valueless. Their findings are summarized as follows: the medial popliteal nerve showed functionally useful motor recovery in 79% of cases, but in only 22% was functionally useful recovery of the tibialis posterior present. There was no functionally useful recovery of the intrinsic muscles of the foot. There was useful recovery of sensation which included the sole of the foot in 62% of cases. Lateral popliteal nerve showed useful motor recovery in 36% and useful sensory recovery in 74%. The authors noted that standard treatment was followed in almost all instances. The nerve was sutured as a secondary procedure when certain conditions were fulfilled; these were (i) that the wound was well healed, (ii) that any fractures present were stable, and (iii) that the knee joint could flex to 90°. The nerve lesion was resected until nerve bundles pouted freely and there was no evidence of intraneural scarring. Full mobilization was carried out, then the tourniquet was released and bleeding was controlled before suture. Nerve suture was performed using fine silk, human hair or plasma clot. An histological examination was carried out on the resected nerve. The limb was immobilized in plaster by means of a spica, both the hip and the knee being included. The hip was released in the third week, and in the fourth postoperative week the knee was gradually extended by means of a turnbuckle. Three variables were noted and investigated statistically: (i) The time between wounding and suture; (ii) the extent of the gap after resection of the nerve lesion; (iii) the level of the nerve lesion. It is noted that generally the earlier suture is done after the wounding the better. It did not appear that the width of the gap was important. This was a contrast to the findings of nerve lesions in the upper limb, probably because the area was more vascular. It was found that the level affected prognosis and the higher the lesion the less satisfactory the result was likely to be. Assessment was also made of the results of nerve grafting. Cable grafts had been used, with three strands of smaller nerves, in an effort to make up for the discrepancy in the size of the sciatic nerve. It was found that generally this procedure was not satisfactory for major trunks, and that no worthwhile sensory or motor return occurred. It was considered that it was not justified in sciatic nerve lesions.

Non-Union in Fractures of the Femoral Neck.

A. J. HAROLD (*J. Bone Jt Surg.*, May, 1960) presents an hypothesis that there is a system in synovial joints which tends to preserve the joint cavity after injury. This system works by tending to prevent the coagulation of blood shed into the joint and rapidly removing any clots that form. It is suggested that the same system perpetuates the fracture gap in wholly intraarticular fractures. A high percentage of fractures of the neck of the femur fail to unite, and these fractures will not unite unless they are accurately reduced and accurately pinned. This injury is distinguished from other fractures in that union never occurs spontaneously (i.e. when the patient is treated by simple rest of the injured limb in bed); union is entirely dependent upon specially skilled treatment. The author considers that there is no reason to suppose that non-union in treated cases has a different cause from non-union in untreated cases. Imperfect reduction does not lead to healing of the fracture in a bad position, but to complete failure of repair. Therefore union depends to an unusual degree upon the strictness of the immobilization. When non-union becomes apparent, it presents as a complete redisplacement of the fracture, unlike the doubtful mobility of ununited fracture of the shaft. Non-union is also associated with remarkable absorption of bone at both fractured surfaces and so the femoral neck disappears. The author discusses experimental work with animals in investigation of the development of clot within the knee of a rabbit. This supports his suggestion that there is a deficiency of fibrinogen within the joint which prevents the formation of a true clot, and that the absence of a lasting clot in synovial joints prevents the formation of granulation tissue and preserves the joint space and movement after injury. This failure of repair which occurs within synovial joints involves fibrous tissue as well as bone, and this suggests that the failure of repair occurs at or before the stage of organization of the fracture hæmatoma.

British Medical Association.

NEW SOUTH WALES BRANCH: SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on April 28, 1960, at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney, DR. B. A. COOK, the President, in the chair.

Backache.

DR. C. V. SALISBURY read a paper entitled "Backache in Gynæcology" (see page 614).

DR. L. D. WHEELER read a paper entitled "Backache in Women—Urological Aspects" (see page 616).

DR. W. HUGH SMITH, in opening the discussion, said that the gynæcologist, the urologist and the orthopædic surgeon all had their places in diagnosing the causes of backache. It was important that each should bear in mind causes outside his own immediate field of interest.

DR. S. D. MEARES said that he agreed with Dr. Salisbury that there were few gynæcological causes of backache, and that the gynæcologist could cure pain in the front of the patient, but not at the back. However, prolapse in association with retroversion could cause backache. The retroversion did not need to be dealt with, but a repair operation to lift the uterus up would relieve the backache. Dr. Meares then quoted two cases. The first was that of a woman, aged 31 years, who had been overseas for two years, and during that period had been perfectly normal in all respects; on the day that she arrived back in Australia, she began to suffer from excessive menstrual loss, abdominal dysmenorrhœa and backache, and those disabilities continued for about a year. It was quite obvious that she did not want to come back to Australia; such a combination of circumstances was often seen. She had such severe menorrhagia that she was anæmic and needed blood transfusions. The process went on, in spite of treatment; everything was tried, but nothing did much good. After about a year, the patient was found to have a polypus; he removed the polypus, and the result was a complete cure. Dr. Meares stressed the error that had been made, and pointed out that backaches were important in gynæcology, and that it was essential to try to find the cause. He then quoted a second case, that of a patient referred to him by a physician. The patient, aged about 45 years, had never been pregnant before and weighed 15 stone. She was pregnant and hypertensive. When she reached term, Cæsarean section was thought to be the best means of delivering her; it was successfully performed, the baby was safely delivered, and everyone was satisfied. About eighteen months later she presented again, pregnant for the second time. Dr. Meares said that he considered that Cæsarean section would be performed again, and that the pregnancy would go to term as the first had done. The patient was in the care of a physician also, and he instructed her about diet, etc. At about 26 weeks she complained of backache; that had not occurred in the first pregnancy. The cause was thought to be clear—overweight, altered carrying angle, etc. Suitable corsets were provided, but she still complained of backache. She was sent to a physician, to see what he could do. A little later she returned; the backache was worse, and was worrying her at night. Dr. Meares and the physician arranged to have her admitted to hospital; the fœtus was not yet viable. She was put to bed, but the backache went on. Another opinion was sought; traction to the legs was recommended, on the grounds that the backache was due to pressure on nerves. Then a nodule was discovered in her scalp. The orthopædic surgeon who had put the traction on her legs asked for an X-ray examination; secondary deposits in the spine were found. The orthopædic surgeon took a biopsy, which showed adenocarcinoma. The patient was found to have an adenocarcinoma of the breast about 1 cm. in diameter, with secondary deposits in the spine and skull. She died undelivered.

DR. J. MOLONEY said that, as Dr. Wheeler had pointed out, unless a thorough clinical examination was carried out and a first-class history taken, they were not even touching on diagnosis and treatment. Dr. Meares' cases were in that category. Not all backaches were just backaches. They could be divided according to the sex of the patient; those suffered by women were totally different from those of men. Most women, when asked to do so, could touch their toes; few men could do so. A positive result to the straight leg raising test was infrequently obtained in backache in women, but frequently in men. Gynæcological and urological disorders could cause backache; but in acute backache of men, there were many more causes than the slipped lumbar invertebral disk. However, whatever the cause of acute backache, until the orthopædic surgeons solved the problems of disk surgery, they would not solve the acute backache problem. Dr. Moloney said that Dr. Wheeler should have mentioned the rare problem of acute retention of urine in spondylolisthesis.

DR. ADRIAN PAUL referred to osteoporotic backache, which occurred some years after the ovaries had been removed or had ceased to function; he said that it was very common. With regard to the slipped intervertebral disc, he said that from past experience in general practice, one golden rule that general practitioners learned was to relieve the pain by whatever means were possible immediately and effectively until the spasm was relieved. If that was done, in a number of cases the acute disc lesion would resolve and cause no further trouble.

DR. M. C. MCKINNON said that often continuous constipation associated with some degree of uterine prolapse gave rise to constant backache, which could be relieved by relatively simple measures. With regard to prolapsed discs, he had been struck by the number of patients who recovered spontaneously or in spite of various types of treatment. Anyone could cure sciatica if they could get the patient to the sixth week. Similar things occurred in the upper part of the body—for example, neuritis in the shoulder was cured by heavy doses of sodium salicylate. Often patients knew that the pain would be better in six weeks, and refused treatment. Dr. Paul had referred to the relief of muscle spasm. Dr. McKinnon said that several things were used for it which, although they were slightly incapacitating to the patient, often caused a period of comfort followed by subsequent recovery. One method of treatment was injection of the sciatic nerve with "Proctocaine". Dr. McKinnon finally said that he had been glad to hear the lithotomy position incriminated as causing trouble, and quoted some illustrative cases.

DR. C. CONACHER, speaking as an orthopædic surgeon, said that he examined many patients with painful backs. He took a careful history and made a thorough examination; but he did not feel competent to examine the prostate or to carry out a vaginal examination. If the patients had no gynæcological or urinary symptoms, he asked what were the chances of his missing something of that type.

DR. G. KERRIDGE said that he had been worried by a patient who was six or seven months pregnant and who suffered from severe sciatica. He asked what he could do about it.

DR. R. W. THOMPSON said that many different pathological lesions would cause backache, so it was useful to divide cases into those in which a serious lesion could be found by clinical or X-ray investigation, and the much larger group, in which no such lesion could be demonstrated. Cases of lumbar disc protrusion were included in the second group, although naturally a disc protrusion might cause symptoms and signs of great seriousness.

DR. L. BRENNER, referring to disc lesions, said that while in London he had been impressed by the work of Dr. James Cyriax, at St. Thomas' Hospital; he advised manipulation for this condition, while observing definite indications and contraindications. Dr. Brenner said that he had seen a number of good results, especially in cases of recent origin. Some of the patients had had to be carried in, and yet were sufficiently improved to be able to walk out and be fit for work in a few days. Older patients also did very well, and he had seen two women, who had been offered laminectomy elsewhere, rendered symptom-free after three manipulations over a period of a week and a half.

DR. T. J. CLAFFEY asked Dr. Brenner whether, at St. Thomas' Hospital, he had had experience of cases such as two of which he knew, in which patients with acute prolapsed discs, apparently correctly diagnosed, after manipulation had had to undergo laminectomy in the middle of the night because of paraplegia.

Dr. Brenner, in reply to Dr. Claffey, said that he had had no experience of such an occurrence, nor had he heard about it in Cyriax's clinic. Dr. Brenner again emphasized that Cyriax had rigid criteria, which had to be satisfied before he ordered manipulations, to prevent the possibility of such an unfortunate complication.

Dr. Salisbury, in reply, said that any doctor who had a female patient with pain in the back and did not carry out a vaginal examination was extremely wrong; he had a good chance of missing a carcinoma of the cervix. Dr. Salisbury then referred to the criticism that had been levelled at the medical attendant who, in an attempt to cure backache, removed one ovary or one testicle. He said that such an

approach was very rare. Gynæcological work differed from no other; one took good care to preserve the gonads in both male and female patients. In conclusion, Dr. Salisbury said that most people held that retroversion caused no backache; but it did, very frequently, and often required operative treatment if it was complicated by other conditions.

Dr. Wheeler, in reply, referred to the woman with backache during pregnancy, due to secondary deposits in the spine, who had not had an X-ray examination. He pointed out that X-ray examinations during pregnancy were now discouraged, and although in the case quoted such an examination was well justified, one should be most sparing with radiological investigation at any stage of a pregnancy.

Dr. Cook, from the chair, said that he took a conservative view regarding treatment of disc lesions. Most patients treated conservatively did very well. He was not enthusiastic about surgical treatment though no doubt it had a limited field of usefulness. Very few patients were ever able to resume their normal job after operation, according to the medical officer of a large Government instrumentality with whom he had discussed the problem. Dr. Cook thanked the speakers for their papers, and also those who had contributed to the discussion.

AUSTRALIAN RHEUMATISM ASSOCIATION: PARR RHEUMATIC PRIZE.

THE Parr Rheumatic Prize, to the value of 50 guineas, will be awarded for the work judged to be the most valuable contribution to rheumatology in the sphere of rheumatic research carried out in Australia during the years 1958, 1959 and 1960. Reports of such work published or submitted for publication should be sent by December 31, 1960, to Dr. R. G. Robinson, Honorary Secretary, Australian Rheumatism Association (B.M.A.), 141 Macquarie Street, Sydney. Three copies are required.

VICTORIAN BRANCH.

Section of Preventive Medicine.

THE annual meeting of the Section of Preventive Medicine of the Victorian Branch of the British Medical Association will be held in the Medical Society Hall, 426 Albert Street, East Melbourne, on Thursday, November 10, 1960, at 4.30 p.m. After the meeting, Dr. J. H. W. Birrell will give an address on "Road Accidents". All those interested are invited to be present at this address.

Out of the Past.

ON HYDATIDS OF THE LUNG.

[From "On Hydatids of the Lung, Their Diagnosis, Prognosis and Treatment", by S. Dougan Bird, Melbourne, 1874.]

THE author may claim to originality thus far, that specific rules for the Physical Diagnosis of the unbroken Hydatid Cyst within the chest wall are not to be found elsewhere.—Preface.

The conditions then, which we have in these cases to bring about signs recognisable by the usual methods of physical diagnosis, are these, supposing the case to be uncomplicated and the cyst of moderate size—in fact, an average cyst suitable for immediate tapping; a cyst, embedded in healthy lung tissue, more or less globular in form, containing fluid, slowly enlarging towards the periphery of the chest as affording the least resistance. Dr. Walshe says, "So long as a sac remains unbroken, the physical signs simply indicate solidification; the quantity of respiration sound will vary with the existence or absence of pressure on an important bronchus." Now, with all deference to the opinion of so high an authority, I must assert that this is in no way borne out by my own observation. When the cyst is still small, and it consequently exerts little or no pressure on any important bronchus or blood vessel, the signs are indeed simply nil. But as it enlarges, the pressure being always centrifugal, only a layer of lung mechanically squeezed and emptied of blood and air, and the two layers of pleura intervene between it and the chest wall. The result of this in physical signs is, therefore, a nullity of respiration sound, no air whatever entering the compressed lung, though beyond the clearly defined margin of the cyst the breath sounds are at once normal. The signs of consolidation are absent, while the negative and positive signs of fluid are prominent even to fluctuation, which may sometimes be palpably detected in thin persons, long before any bulging of the intercostal spaces takes place, especially if the tension of the cyst is not excessive. The compressibility of a layer of lung tissue by the gradual enlargement of a cyst of this kind is very remarkable, and the practical results of such pressure on its future, if too long continued, most important. It is very rare to find any interval between an absence of physical signs and the actual (to all intents and purposes, as explained above) impingement of the sac on the chest wall. It is quite possible, however, that the reason of this may be, that patients do not generally apply till this last state of things comes about.

The following, then, are the physical signs observable in a case of hydatid cyst of the lung which has progressed to the capacity of a pint or more of fluid, without interference from within or without:—Expansion more or less deficient on the affected side; mensuration but little affected; absolute dulness on percussion, with absence of respiratory sounds over a space of the chest-wall not smaller than the palm of the hand, generally in the lateral or infra-clavicular regions, with absence of vocal fremitus in most cases. This dull space always presents a rounded outline—is limited by a line of demarcation so exact that it can be mapped out with pen and ink, and is unaltered by position. Beyond the boundary line percussion is clear and normal. The respiratory sounds, though inaudible over the dull surface, commence immediately beyond the pen line, and though probably rather harsh and puerile in character, are indicative of healthy lung tissue. Besides this, the distinctive vibratile thrill of fluid may sometimes, but not always, be detected by percussion over the intercostal spaces—a perfect exemplification of "peripheric fluctuation". The percussion and respiratory sounds over the rest of the lung are probably not much altered. A localised pleuritic effusion, confined by adhesions, would fulfil the above physical signs; but such a state of things is very rare, and would probably be preceded by a history of pain and febrile symptoms. In fact, one is reduced to the conclusion that there is a sac containing fluid within the chest wall, slowly enlarging; causing little or no pain or local irritation, not the result of any inflammatory effusion, but foreign to, though growing in, the thoracic viscera. A hydatid cyst alone combines all these characters, so that the diagnosis may be reduced almost to a certainty.

Medical Matters in Parliament.

SENATE.

THE following extracts from *Hansard* relate to the proceedings of the Senate.

August 17, 1960.

Health.

SENATOR MAHER (through Senator Dame Annabelle Rankin) asked the Minister representing the Minister for Health, upon notice:

1. Has the Minister seen (a) the press statement which reported that Dr. Baker, an Indian physician, said he was appalled at the methods of mass vaccination against poliomyelitis as practised in Victoria, where in many instances the one syringe and needle was used on all those offering for vaccination, and (b) the statement by Dr. Gill, published in the current issue of the Medical Journal of Australia, strongly criticizing the use of multiple syringes which, it is suggested, could cause a transfer of hepatitis virus from one person to another by cross infection?

2. Is any action contemplated to meet these serious objections to methods of vaccination said to be practised in this country?

SENATOR HENTY: The Minister for Health has now furnished the following reply:

1. (a) Yes; (b) Yes.

2. The Victorian Health Commission has carefully investigated the practice in Victoria, the subject of Dr. Baker's criticism, and is satisfied that the method used is quite safe. Mass immunizations conducted by the Commonwealth Department of Health are required to be performed with the use of individual needles.

September 7, 1960.

Thalassæmia.

SENATOR BUTTFIELD: Is the Minister representing the Minister for Immigration aware of a statement made by Dr. J. G. Wilson at the Adelaide Children's Hospital that migrants of Mediterranean origin could be the cause of the increase in a disease in children known as thalassæmia? If this assumption is not correct, will the Minister take steps immediately to remove any slur upon a section of the Australian community which feels, rightly or wrongly, that it is frequently being singled out for unfavourable publicity? If it is correct, can the Minister inform the Senate what steps are being taken to eliminate such a possibility?

SENATOR HENTY: I did see the article in question and, as I thought a question about the matter might be asked by honorable senators, I consulted the Minister for Health and the Minister for Immigration. This matter comes within the jurisdiction of the departments administered by those honorable gentlemen. The Minister for Immigration has furnished me with the following information:

Migrants from countries bordering upon the Mediterranean, in common with other migrants, must undergo a medical examination and satisfy the standards laid down by the Australian health authorities as one of the conditions of admission to this country. It has not hitherto come under notice that the incidence of thalassæmia in Australia is giving cause for concern, but inquiries are in progress, and the result will be conveyed to the honorable senator.

The Minister for Health replied as follows:

I am not aware of the precise terms of any statement Dr. Wilson may have made. Thalassæmia is a disease in which there is a defective formation of hæmoglobin, the red pigment of the blood, with a consequent anæmia. There are two forms—major and minor. The major form is rapidly fatal. The minor form may exist unnoticed for many years and does not appear to be entirely incompatible with ordinary life and activity.

The disease occurs with comparative frequency among inhabitants of the Mediterranean littoral and has probably been introduced into Australia from that region. For a doctor to state such facts, if he has done so, does not imply a slur upon anyone. Thalassæmia is an hereditary and not a communicable disease, and those who suffer from it can transmit it only to their descendants. In this regard it has some analogies with such diseases as hæmophilia and colour-blindness.

September 8, 1960.

Cancer.

SENATOR VINCENT asked the Minister representing the Minister for Health, upon notice:

1. Does the Commonwealth Government intend to set up the Federal Anti-Cancer Council referred to at the International Cancer Congress now being held in Melbourne?

2. What will be the purpose of the proposed Federal Anti-Cancer Council?

SENATOR HENTY: The Minister for Health has now furnished the following reply:

1. No. My understanding is that the Federal Anti-Cancer Council mentioned at the Victorian Cancer Congress in Melbourne is intended to be a federation of voluntary bodies.

2. I understand that that purposes of the proposed Federal Anti-Cancer Council are to coordinate interstate activities directed against cancer and to provide material suitable for public and medical education about this disease.

Fluoridation of Water.

SENATOR BRANSON asked the Minister representing the Minister for Health, upon notice:

In view of this continuing controversy in regard to the advantages and disadvantages of adding fluorine to water supplies as a means of preventing tooth decay, will the Minister arrange for the Commonwealth Scientific and Industrial Research Organization to investigate this proposition and inform the Parliament and State and Local Government authorities of the result?

SENATOR HENTY: The Minister for Health has now furnished the following reply:

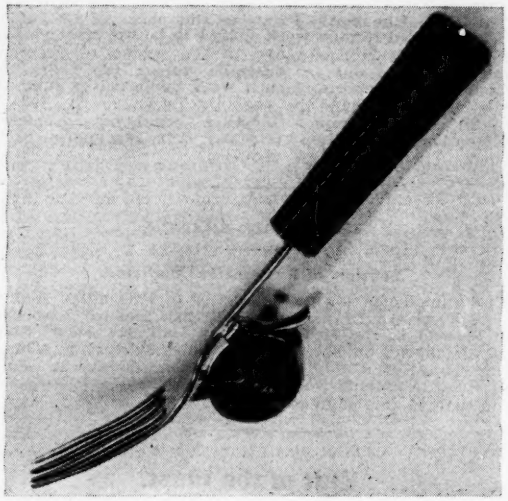
Inquiry into the advantages and disadvantages of water fluoridation as a means of preventing dental caries is a matter for the National Health and Medical Research Council.

The National Health and Medical Research Council has, on a number of occasions, reported upon and recommended water fluoridation as a public health measure and has set out conditions for its proper administration and supervision.

Correspondence.

INSTRUMENT FOR ONE-ARMED PATIENT.

SIR: The *British Medical Journal* (October 24, 1959, page 819) published a review of a combined knife-fork. I sent for one and had several modifications made at our workshops at Eveleigh. Angus and Coote Pty. Ltd., of 500 George Street,



Sydney, are now manufacturing them. It is essentially a dinner fork with a knife-type handle, on the back of which a detachable stainless-steel wheel with a sharp edge rotates. Any patient who is only able to use one hand will find it a great help.

Yours, etc.,

AUSTIN CALLEN,
Chief Medical Officer.

Department of Railways, N.S.W.,
Medical Section,
509 Pitt Street,
Sydney.
September 27, 1960.

PREANÆSTHETIC SEDATION FOR CHILDREN.

SIR: The valid criticism of Dr. J. G. Lomaz (MED. J. AUST., July 23, 1960, page 157) is noted, of our use of a 5% solution of "Pentothal" for induction of anæsthesia in children (MED. J. AUST., June 25, 1960, page 1020), and it is regretted that circumstances have delayed this acknowledgement.

The technical point would appear to be that practically all our injections are given in the veins on the dorsum of the hand, and we have been unable to find any report of complications, due to accidental intraarterial injection, when this site is used. However, to widen still further the margin

of safety, and to standardize the procedure, we have accepted the recommendation of Dr. Lomaz and are now using the 2·5% solution.

Yours, etc.,

Royal Children's Hospital, Orthopædic Section, Mount Eliza, Victoria. September 26, 1960.

GEOFFREY CORNISH,
DOUGLAS GALBRAITH.

Naval, Military and Air Force.

APPOINTMENTS.

THE following appointments, changes, etc., are published in the *Commonwealth of Australia Gazette*, No. 61, of September 1, 1960.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Confirmation in Rank.—Surgeon Lieutenants (for Short Service) (on probation) Terence O'Malley, Cyril Francis Elliott and Kenneth Nicholson Howson are confirmed in the rank of Surgeon Lieutenant (for Short Service), with seniority in rank of 12th January, 1959, 1st March, 1959, and 23rd March, 1959, respectively, dated 12th January, 1960, 1st March, 1960, and 23rd March, 1960, respectively.

Appointments.—Malcolm Hamilton Darroch and Philip Robert Wood are appointed Surgeon Lieutenants (for Short Service) (on probation), dated 1st January, 1960, and 10th March, 1960, respectively.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Extension of Retiring Age.—The retiring age of Surgeon Lieutenant Arthur Henry Keech is extended for a period of two years from 14th September, 1960.

Promotions.—Surgeon Lieutenant Brian Florance is promoted to the rank of Surgeon Lieutenant-Commander, dated 18th May, 1960.

ROYAL AUSTRALIAN AIR FORCE.

Permanent Air Force.

Medical Branch.

Flight Lieutenant A. E. Greentree (022681) is transferred from the Reserve and is appointed to a permanent commission on probation for a period of twelve months, 11th July, 1960, with the rank of Flight Lieutenant.

The probationary appointment of Flight Lieutenant A. C. Denholm (0310777) is confirmed.

Squadron Leader A. V. Coleman (033029) is appointed to a further short-service commission, 23rd September, 1960.

The short-service commission of Squadron Leader A. V. Coleman (033029) is extended to 21st July, 1965.

Air Force Reserve.

Medical Branch.

The following Air Cadets are provisionally appointed to a commission, 10th September, 1960, with the rank of Pilot Officer:—Philip John Chapman (043362), Ian Favilla (043394), Alec Simpson Jordan (043373), Christopher Forbes Laurie (043375), Andrew Kenneth Rolland (043389), Alistair Clive Seymour (043384), John Andrew Smith (043385).

The appointment of the following Flight Lieutenants is terminated, 1st July, 1960:—P. E. Mellows (297517), R. F. McAuliffe (043069), G. Shaw (257689).

THE following appointments, changes, etc., are published in the *Commonwealth of Australia Gazette*, No. 62, of September 8, 1960.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Appointments.—Ian Scott Macmillan and James Stuart Cumming are appointed Surgeon Lieutenants (for Short Service) (on probation), dated 20th April, 1960.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Promotions.—Surgeon Lieutenant Leo Kevin Maginnity is promoted to the rank of Surgeon Lieutenant-Commander, dated 12th May, 1960.

AUSTRALIAN MILITARY FORCES.

Australian Regular Army.

Royal Australian Army Medical Corps (Medical).

The Short Service Commissions granted to the following officers are extended until dates shown.—3/40123 Lieutenant-Colonel A. P. Hanway, 30th September, 1962, and 3/12032 Captain (Temporary Major) C. N. Matthews, 14th March, 1967.

Citizen Military Forces.

Eastern Command.

Royal Australian Army Medical Corps (Medical).—2/56843 Captain (provisionally) A. H. Gibson relinquishes the provisional rank of Captain, 29th May, 1960, is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Eastern Command), and is granted the honorary rank of Captain, 30th May, 1960. The age for retirement of 2/147976 Colonel K. B. Armstrong is extended until 1st July, 1961. *To be Captain (provisionally), 4th July, 1960*—2/243387 Peter Hunt Miles.

Southern Command.

Royal Australian Army Medical Corps (Medical).—3/101042 Captain (provisionally) L. W. Coppleson relinquishes the provisional rank of Captain, 8th April, 1960, is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Southern Command) and is granted the honorary rank of Captain, 9th April, 1960. The provisional appointment of 3/50275 Captain K. B. Layton is terminated 11th May, 1960. *To be Captain (provisionally), 12th May, 1960—3/50275 Keith Basil Layton. To be Lieutenant-Colonel, 1st July, 1960*—3/97030 Major (Temporary Lieutenant-Colonel) P. C. B. Bradley. *To be Temporary Lieutenant-Colonel, 7th July, 1960—3/50287* Captain (Temporary Major) G. G. C. McKenzie.

Central Command.

Royal Australian Army Medical Corps (Medical).—4/32035 Captain R. Britten-Jones ceases to be seconded whilst in the United Kingdom, 29th February, 1960. 4/32035 Captain R. Britten-Jones is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Central Command), 1st July, 1960.

Reserve Citizen Military Forces.

Royal Australian Army Medical Corps (Medical).

Northern Command.—To be Honorary Captains, 8th July, 1960—Richard Douglas Gordon, Colin Graham Suchting and Donald Campbell Boden.

Southern Command.—The resignation of Honorary Captain W. L. H. Armstrong of his commission is accepted, 11th July, 1960. Honorary Captain W. J. McKillop is retired, 31st August, 1960.

Central Command.—Captain D. N. Kekwick is placed upon the Retired List (Central Command) with permission to retain his rank and wear the prescribed uniform, 3rd July, 1960. The following officers are retired, 31st August, 1960:—Honorary Captains F. I. Flaherty and M. Stewart.

The following officers are placed upon the Retired List with permission to retain their rank and wear the prescribed uniform, 31st August, 1960.

Northern Command.—Captain C. W. Taylor.

Southern Command.—Lieutenant-Colonel S. W. Williams.

Western Command.—Major A. D. Smith and Captain G. A. Kelsall.

THE following change is published in the *Commonwealth of Australia Gazette*, No. 65, of September 22, 1960.

AUSTRALIAN MILITARY FORCES.

Australian Regular Army.

Royal Australian Army Medical Corps (Medical).

3/12033 Brigadier A. J. Clyne, C.B.E., relinquishes the appointment of Deputy Director-General of Medical Services,

31st August, 1960, is appointed Director-General of Medical Services, and to be Temporary Major-General, 1st September, 1960.—(Ex. Min. No. 79—Approved 14th September, 1960.)

Obituary.

SIR GORDON GORDON-TAYLOR.

WE are indebted to DR. DOUGLAS MILLER for the following appreciation of the late Sir Gordon Gordon-Taylor.

The news of Sir Gordon Gordon-Taylor's death has made sad the hearts of many Australian surgeons, and it is fitting that we should pay tribute to one who had come to be regarded by us as the living patron saint of British surgery in our country.

I met Gordon-Taylor on his first visit to Australia in 1934. He had come to examine in anatomy for the Primary Fellowship Examination. I think that on this visit he first felt that liking for Australia and its people which developed strongly with many subsequent visits and much time spent here during the war. His affection for us—which he often expressed—was no empty sentiment, but the spring of endless kindnesses and invaluable services. Because of this, it was indeed something for us to be able to give to a departing embryo surgeon a letter recommending him to the interest of Gordon-Taylor. This was a high prize, which we reserved only for those who could be worthy of it. How good it was to visualize them arriving at the Royal College of Surgeons on one of those days which he set aside for receiving and helping them! One could envy them the experience of meeting so famous a man, and finding him so simple, and so genuinely interested in their problems and in giving the practical help which only he could give. How he would quiz them on all the men who had gone before, and how he remembered them and their worth and their performances, was a demonstration of real and deep interest.

Nobody could assess what all this has meant to the surgery of this country—the help and advice in preparation for the "primary", the planning of later study for the fellowship, and the advice concerning and ready access to the most suitable jobs. Who could underestimate the value of a recommendation from this doyen of British surgery? All this he gave to many, and it started them in their careers as surgical leaders.

He had an extraordinary genuineness and candour of expression, keen criticism—especially for anything not British—warm enthusiasm for and appreciation of good men and good work. We all loved him, and when we went to London we looked forward to the chat at the College (interspersed with delicious scandal), the brisk walk through the streets, the carefully planned luncheon (in old days at the Langham and more recently at the Ritz) which he delighted to give. We knew that Christmas would bring the personally-worded card and that picture of Lords which would have pride of place on our mantelpieces.

Very recently, by a happy inspiration, old friends and students in Australia and New Zealand asked him to sit for a portrait by Gunn. He obtained a list of contributors, and each one received a charming note from him—his last letter to most of us. A few weeks ago this beautiful work came to the Royal Australasian College of Surgeons, where it will speak for generations of that lively, inspiring, enthusiastic personality, reminding men of a life dedicated to surgery in a golden age, of wisdom, of lovely surgical skill, and of a personal charm and elegance that lifted him high above the level of ordinary men.

Now he is gone, and we have indeed lost a friend. "You are tough people", he often joked; but withal we sheltered a very tender heart for G.-T. There is none to take his place for us. Who could be his understudy or who his apprentice, in those gifts of friendship which were something so peculiar to himself?

MALCOLM WELD FLETCHER.

WE are indebted to DR. H. M. FISHER for the following appreciation of the late Dr. M. W. Fletcher. This is further to the notice that appeared in the issue of September 10, 1960.

When Malcolm Fletcher left us at the early age of fifty, devotion to duty both in peace and in war claimed another victim. From his student days when I first knew him, Malcolm was always "on the ball", giving all he knew to the task of graduating in medicine. Later, during rehabilitation courses after his war service, I was to see the same eager student struggling to fit himself once more for his future career. There is no doubt that his service in the Royal Navy during those awful trips on convoy duty in northern Europe took their toll of his physical reserve, and contributed in no small measure to his early death.

When I came to Launceston in 1948, one of the first welcoming hands to greet me was that of one of my "old boys", and though we disagreed many times, there was always the link between student and teacher that prevailed. Malcolm was a rigid individualist, one who never hesitated to say what he felt his conscience dictated to him, and more is the pity that there are not more like him. We often disagreed hotly; but afterwards there was always that winsome smile to show that it was all over, and no grudges ever remained. At the last meeting of the B.M.A. that he attended, we were discussing the wearing of crash helmets by motor-cyclists, and the meeting advocated that this be made compulsory. Up jumped Malcolm with fiery enthusiasm: "I don't agree it should be made compulsory. I don't believe anybody should be made to do anything." This perhaps is his best obituary—that he was a fighter for all causes he thought right, but always gave the other fellow his right to do as he thought fit also.

I cannot close without a tribute to him as a family man. His home was a serene place, where his wife Janet was the best refuge a man could have. Her calm demeanour and sympathy with him, I am sure, meant more to him than he was ever capable of expressing; but to see them together was to realize that they were really partners.

We shall miss him for many years; but he will never be forgotten by those who knew him and worked with him.

The Royal Australasian College of Physicians.

VICTORIAN STATE COMMITTEE: SCIENTIFIC MEETING.

THE Victorian Fellows and Members of The Royal Australasian College of Physicians will hold a scientific meeting at Box Hill Hospital, Box Hill, on Saturday, October 29, 1960. The programme will be as follows:

11.30 a.m., The Course of Gastric Ulceration, Dr. C. W. E. Wilson; 12 noon, The Diagnosis of Malabsorption, Dr. M. Ralston; 12.45 p.m., luncheon; 1.45 p.m., Radiology in Portal Hypertension, Dr. W. S. C. Hare; 2.15 p.m., The Management of Liver Failure, Dr. W. E. King; 2.45 p.m., Surgery in Ulcerative Colitis, Mr. E. S. R. Hughes; 3.45 p.m., Mucoviscidosis, Dr. C. Anderson; 4.15 p.m., The Blind Loop Syndrome, Dr. P. J. Parsons.

Notes and News.

National Health Week.

National Health Week will be launched by the Commonwealth Minister for Health, Dr. D. A. Cameron, on October 16. The theme will be "Community Health Is Your Responsibility". In South Australia the particular aspect of the theme is "Summer Infections".

Royal Australian Army Medical Corps Dinner.

As part of the annual Corps Day celebrations for 1960, the officers of the R.A.A.M.C. will hold a dinner at the Imperial Service Club, Barrack Street, Sydney, on Saturday, November 5, 1960, at 7 p.m. Prior to the dinner there will be a simple wreath-laying ceremony at the Cenotaph at 6.15 p.m. An invitation is extended to all officers who are now serving, or have ever served, with medical units or installations. It is especially desired that ex-officers on the retired or reserve lists be present. The estimated, all-included cost is £3 per member, payable in advance. Cheques

should be made payable to: R.A.A.M.C. Corps Day Celebrations Fund. Further information may be obtained from the R.A.A.M.C. Corps Day Committee, C/- 5 Field Ambulance, Carrington Road, Randwick.

Post-Graduate Work.

THE POST-GRADUATE MEDICAL FOUNDATION OF THE UNIVERSITY OF SYDNEY.

Applications for Grants.

APPLICATIONS for grants from the Post-Graduate Medical Foundation are now invited. It is expected that the applications will fall under one or more of the following three broad headings: (i) research or educational grants to individuals working in, or using the facilities of, institutions; (ii) research or educational grants to institutions or university departments; (iii) fellowships and personal grants for research and education at home and abroad. Applications which do not fall under these headings should be made separately in writing and should contain full details.

Applications must be made on the forms provided, through or by university departments, hospitals, other institutions or organizations, and up till October 26 should be addressed as follows: The Honorary Director, The Post-Graduate Committee in Medicine, 131 Macquarie Street, Sydney.

From October 26 onwards, the Committee's offices will be located at 188 Oxford Street, Paddington, N.S.W.

The necessary forms and any further information may be obtained from the Honorary Director at the addresses given above. Applications close at 188 Oxford Street, Paddington, at noon on Friday, November 25, 1960.

Summer School in Electron Microscopy, 1960.

It is proposed to hold a summer school in electron microscopy at the University of Sydney from December 5 to 10, 1960. The fee for attendance will be in the vicinity of £45. The course will cover the general principles of electron microscopes and electron microscopy including the preparation of specimens for examination. Because of limited facilities, it will be necessary to limit the number of participants in the school, who should be of graduate standing in a relevant branch of science. Further particulars may be obtained from Dr. D. G. Drummond, Electron Microscope Unit, University of Sydney.

THE MELBOURNE MEDICAL POST-GRADUATE COMMITTEE.

Postponement of Course at Wangaratta.

THE Melbourne Medical Post-Graduate Committee wishes to announce that the course arranged for Wangaratta has been postponed from October 22 to October 29, 1960.

Notice.

THE CHILDREN'S MEDICAL RESEARCH FOUNDATION OF N.S.W.

THE following is a list of donations to the Children's Medical Research Foundation of N.S.W. received from members of the medical profession in the period July 11 to September 26, 1960:

Professor and Mrs. Lorimer Dods (further) £150.

Dr. Bruce S. Pearson £131 11s.

Dr. Donald Vickery (further), Dr. E. Murray-Will (further), £100.

Dr. Ivan Uren £55.

Dr. and Mrs. Colin Allworth, Sir Norman Gregg (further), Dr. and Mrs. R. I. Furber (further), D.V.C. £50.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED SEPTEMBER 10, 1960.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	1(1)	2(1)	4(3)	..	2(2)	..	1	..	10
Amœbiasis	..	..	..	..	1(1)	..	..	..	1
Ancylostomiasis	..	..	..	..	..	..	7	..	7
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	1(1)	..	..	..	..	..	..	1
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	6(6)	28(24)	9(7)	..	..	..	1	2	46
Diphtheria	..	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	..	..	1	6(6)	..	..	1	..	8
Encephalitis	1(1)	..	1	2(1)	..	..	..	..	4
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	..	..	..	..	..	..	..	..
Hydatid	..	2(2)	..	1	..	..	..	..	3
Infective Hepatitis	101(56)	56(38)	21(4)	17(11)	5(5)	..	..	..	200
Lead Poisoning	..	..	..	..	..	..	..	..	..
Leprosy	..	..	..	..	..	..	2	..	2
Leptospirosis	..	..	..	..	..	..	..	..	..
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	1(1)	1	..	..	..	..	1	..	3
Ophthalmia	..	..	..	..	..	..	..	1	1
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	..	1(1)	..	..	..	..	..	..	1
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	..	15(10)	..	2	2(2)	..	..	..	19
Salmonella Infection	..	..	..	1(1)	1(1)	..	..	2	4
Scarlet Fever	7(5)	15(8)	3(1)	4(4)	2(2)	..	..	..	31
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	..	..	3	..	..	..	..	..	3
Trachoma	..	..	..	..	..	..	3	..	3
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	32(23)	17(14)	9(3)	11(7)	4(3)	3	3	..	79
Typhoid Fever	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

Dr. and Mrs. R. P. Crooks, Dr. and Mrs. E. J. Gazzard (further), Dr. T. Y. Nelson (further), Dr. F. C. Rogers (further), Dr. and Mrs. A. Assef £25.

Dr. G. A. M. Heydon £17 10s.

Dr. Pamela Bulteau (further), Dr. Noelene Cappe and Dr. Philip Cappe £15 15s.

Dr. L. T. Milgate £15.

Dr. Anna B. Gardiner £12 9s. 1d.

Dr. J. W. Knox, "Hengrove Hall" Tenants' Fund £11 3s.

Dr. John Oliver (further) £10 10s. 6d.

Dr. and Mrs. R. W. Tinsley, Dr. and Mrs. Douglas Warden, Dr. and Mrs. Swan, Dr. J. O. Marel, Dr. M. J. Cronin £10 10s.

Dr. E. Cranston, Dr. and Mrs. Hugo de Burgh, Dr. Ruth Godden £10.

Dr. Lewsbe Abbott £7.

Dr. and Mrs. W. Deligdish, Dr. John R. Coyne, Dr. G. C. T. Burfitt-Williams (further), Dr. F. C. McCredie (further), Dr. and Mrs. Volney Bulteau, Dr. A. W. J. Bulteau £5 5s.

Dr. D. M. Campbell, Dr. and Mrs. A. W. Middleton, Dr. Mervyn Elliott £5.

Dr. L. P. Hiatt and Dr. H. C. Anderson (in memory of Dr. Arthur Shappere), Dr. L. G. Crane £3 3s.

Dr. E. Sidoti £2 10s.

Dr. P. W. Sundin £2 4s. 5d.

Dr. and Mrs. H. LeMaistre, Dr. J. Barbour, Dr. P. A. Hanks (further) £2 2s.

Dr. J. A. Hickson £2.

Dr. L. Streimer £1 1s.

Previously acknowledged: £10,372 8s. 10d. Total received to date: £11,488 9s. 10d.

Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Henderson-Smart, Arthur MacCubbin, M.B., B.Ch., 1947 (Univ. Witwatersrand), c/o Drs. Smith and Florance, Springwood.

THE undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Chapman, John Clarence, M.B., B.S., 1960 (Univ. Sydney); Johnson, Adrian Paul, M.B., B.S., 1960 (Univ. Sydney); Redwin, Ronald James, M.B., B.S., 1960 (Univ. Sydney); Selby Brown, Colin, M.B., B.S., 1960 (Univ. Sydney); Turtle, John Ross, M.B., B.S., 1960 (Univ. Sydney); Braggett, Michael Ernest, M.B., B.S., 1958 (Univ. Sydney); Coy, Lawrence Bernard, M.B., B.S., 1958 (Univ. Sydney); Foote, Alan Gregory, M.B., B.S., 1958 (Univ. Sydney); Georgouras, Katherine Evelyn, M.B., B.S., 1955 (Univ. Sydney); James, Philip, B.M., B.Ch., 1957 (Univ. Oxford); Jones, Donald George, M.B., B.S., 1959 (Univ. Sydney); Kinder, Kingston Alfred, M.B., B.S., 1957 (Univ. Sydney); Nemeth, William, M.B., B.S., 1959 (Univ. Sydney); O Neill, Charles Main, M.B., B.S., 1956 (Univ. London); Pearson, Bruce James, M.B., B.S., 1959 (Univ. Sydney); Tuckwell, Leonard Arthur, M.B., B.S., 1958 (Univ. Sydney); Malinowski, Henryk Leonard, M.D., 1936 (Univ. Bologna), licensed under Section 21c4 of the *Medical Practitioners Act*, 1938-1958; Selecki, Edward Emanuel, M.D., 1951 (Univ. Cracow) registered under Section 17 (2A), *Medical Practitioners Act*, 1938-1958.

Deaths.

THE following deaths have been announced:

LEE.—Harrie Bertie Lee, on September 29, at Hobart.

MILLIKEN.—Ewen Douglas Milliken, on October 1, 1960, at Melbourne.

Diary for the Month.

OCTOBER 17.—Victorian Branch, B.M.A.: Finance Sub-Committee.
OCTOBER 18.—New South Wales Branch, B.M.A.: Medical Politics Committee.
OCTOBER 19.—Western Australian Branch, B.M.A.: General Meeting.
OCTOBER 20.—Victorian Branch, B.M.A.: Executive Meeting of Branch Council.
OCTOBER 20.—New South Wales Branch, B.M.A.: Clinical Meeting.
OCTOBER 21.—New South Wales Branch, B.M.A.: Ethics Committee.
OCTOBER 25.—Tasmanian Branch, B.M.A.: Southern Subdivision.
OCTOBER 25.—New South Wales Branch, B.M.A.: Hospitals Committee.
OCTOBER 26.—Victorian Branch, B.M.A.: Branch Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

Authors of papers are asked to state for inclusion in the title their principal qualifications as well as their relevant appointment and/or the unit, hospital or department from which the paper comes.

References to articles and books should be carefully checked. In a reference to an article in a journal the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of article. In a reference to a book the following information should be given: surname of author, initials of author, year of publication, full title of book, publisher, place of publication, page number (where relevant). The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full data in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this Journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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